Environmental Assessment

for the

Management of Mute Swans in the Atlantic Flyway

Prepared by

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ACRONYMS

AFC	Atlantic Flyway Council
APHIS	Animal and Plant Health Inspection Service
BBS	Breeding Bird Survey
CBC	Christmas Bird Count
CFR	Code of Federal Regulations
DEC	Department of Environmental Conservation
EA	Environmental Assessment
DNR	Department of Natural Resources
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
MBTA	Migratory Bird Treaty Act
MDNR	Maryland Department of Natural Resources
MSMSS	Mute Swan Mid-Summer Survey
NEPA	National Environmental Policy Act
SAV	Submerged Aquatic Vegetation
Service	U.S. Fish and Wildlife Service
SPITS	Service Permits Issuance and Tracking System
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WS	Wildlife Services

PREFACE TO FINAL ENVIRONMENTAL ASSESSMENT

This preface is intended to facilitate public review of the final EA. The preface contains a description of significant changes incorporated in the final document and a summary of the proposed action.

A. Changes from the Draft Environmental Assessment

Following the close of the public comment period on the draft EA, which extended from July 2 to July 16, 2003, the U.S. Fish and Wildlife Service reviewed public comments and responded to them (see Appendix E), but made no substantive changes to the preferred alternative (see below). The following editorial changes have been made to the EA:

- We noted that, in addition to the 3.73 kilograms (8.2 pounds) of submerged aquatic vegetation eaten daily by adult mute swans, each bird may uproot and destroy (but not consume) an additional 20 pounds daily (Section I.C.2.a - Impacts on Wetland Habitats).

- We inserted an additional published reference (Hindman and Harvey 2003) to the impacts of mute swans on SAV and SAV restoration efforts in the Chesapeake Bay (Section I.C.2.a - Impacts on Wetland Habitats).

- We inserted two peer-reviewed references (Krull 1970 and Hurley 1991) to the impacts of mute swans on habitats that provide shelter and food for fish, shellfish, and macro-invertebrates (Section I.C.2.b(1) - Indirect Impacts on Native Species).

- We inserted three sentences that describe observed displacement of tundra swans by mute swans from areas of the Chesapeake Bay that provide protected winter shelter and that predict potential future interactions between the two species (Section I.C.2.b(2) - Indirect Impacts on Native Species).

- We inserted an observation documenting the use of agricultural fields by small numbers of mute swans in Maryland (Section I.C.2.c(1) - Nuisance Problems in Commercial Agriculture).

- We corrected the figures for the number of birds authorized to be taken nationwide in Calendar Year 2002 (1,758 versus 1,760), the number of birds reported to have actually been taken (248 versus 250), and the number of birds relocated (8 versus 0) (Section IV.C.5.b(1) - Control Activities in Calendar Year 2002).

- We corrected figures for the number of permits issued nationwide in Calendar Year 2003 (66 versus 62), the number of birds authorized to be taken (3,605 versus 3,226), the number of nests in which eggs could be addled (2,214 versus 1,793) (Section IV.C.5.b(2) - Control

Activities in Calendar Year 2003).

- We corrected figures for the number of birds authorized to be taken in the Atlantic Flyway in Calendar Year 2003 (3,102 versus 2,702), the number of birds authorized to be taken in the State of Maryland (1,700 versus 1,600), and the number of birds authorized to be taken in all remaining States in the Flyway (1,402 versus 1,102) (Section IV.C.5b(2) - Control Activities in Calendar Year 2003).

- We provided updated information about NEPA coordination and Section 7 consultation under the Endangered Species Act (Section VI - Coordination and Consultation).

- We edited the figures in Table 7 to accurately reflect the information available in the Service Permits Issuance and Tracking System (SPITS), and explanatory footnotes were added.

- We edited the figures in Table 7 to accurately reflect the information available in the Service Permits Issuance and Tracking System (SPITS), and explanatory footnotes were added.

The draft EA referenced a draft Atlantic Flyway Mute Swan Management Plan (Atlantic Flyway Technical Committee 2003), and that citation is unchanged in the final EA. The draft Atlantic Flyway Mute Swan Management Plan was revised while the draft EA was being prepared, and the final plan was adopted by the Atlantic Flyway Council on July 25, 2003 (Atlantic Flyway Council 2003). Thus, references in the final EA to Atlantic Flyway Technical Committee (2003) should be considered synonymous with the Atlantic Flyway Council (2003).

B. Summary of the Proposed Action

The U.S. Fish and Wildlife Service has proposed issuing migratory bird depredation permits authorizing the take of up to 3,100 feral mute swans (*Cygnus olor*) annually in the Atlantic Flyway for the next ten years. The primary goal in implementing this action is to minimize environmental damages attributed to mute swans in a feasible and cost-effective way, consistent with the Service's responsibility to manage and conserve mute swan populations under the Migratory Bird Treaty Act and conventions and other applicable law. A secondary goal–and the most effective means for achieving the first goal–is to reduce populations of feral mute swans to pre-1986 levels.

The need for the action stems from documented scientific evidence of the negative impacts that a growing population of mute swans is having on wetland habitats and native species of fish and wildlife, the threats that mute swans pose to human health and safety, and the damage that they can cause to commercial agricultural crops. The action will support implementation of a U.S. Fish and Wildlife Service policy on management of mute swans on national wildlife refuges, and

implementation of the Atlantic Flyway Mute Swan Management Plan.

The specific Service action will be the issuance of migratory bird depredation permits to State wildlife agencies, USDA/APHIS Wildlife Services, national wildlife refuges, and others to take mute swans in the Atlantic Flyway, in accordance with 50 CFR § 21.41 and the State-specific take guidelines presented in the final EA, to allow for the integrated population management of mute swans. Each permit application will be reviewed to ensure that the planned activity meets the goals and objectives of the Atlantic Flyway Mute Swan Management Plan (Atlantic Flyway Council 2003) as specified in the final EA, that the proposed take does not exceed the Service's State-specific take guidelines, and that the cumulative impacts will not irreparably harm the Flyway-wide population. The State-specific take guidelines will be reviewed annually and revised as necessary to ensure that Statewide and Flyway-wide populations are not reduced below target levels.

I. PURPOSE AND NEED FOR ACTION

A. Introduction

Alarmed by recent rapid growth of the population, and aware of the potential and actual detrimental impacts that exotic waterfowl such as the mute swan (*Cygnus olor*) can have on native plant and animal communities (Weller 1969), wildlife professionals have argued the need for a coordinated and cooperative program to reduce mute swan populations to predetermined and manageable levels designed to minimize ecological impacts (Atlantic Flyway Council 1997, Nelson 1997, Connecticut Department of Environmental Protection 1999, Perry et al. 2001, Petrie and Francis 2001, Petrie 2002, Atlantic Flyway Technical Committee 2003, Maryland Department of Natural Resources 2003).

The mute swan is not native to the U.S. It was first introduced to the U.S. in the late 1800's as an ornamental waterfowl to grace the gardens, pools, and ponds of the great estates of the upper classes. The importation of exotic birds, especially those familiar to recent immigrants from the "Old Country," was quite fashionable at the time (Long 1981). Now, one hundred years later and with mute swan populations well established along the Northeast Atlantic Coast and in the Great Lakes Region, the mute swan is one of four naturalized species of birds to be considered invasive (Laycock 1966, Cox 1999), the others being Rock Dove (*Columba livia*), European Starling (*Sturnus vulgaris*), and House Sparrow *(Passer domesticus*).

The mute swan is a frequent subject of children's books, fairy tales, nursery rhymes, literature, music, and dance because of its graceful form and beauty. Thus, it is easy for people to identify with, and form strong bonds of attachment to mute swans. Indeed, a small segment of the public harbors strong emotional, sentimental, and spiritual bonds of affection for mute swans because of their pleasing aesthetic nature (Holloway 1999). These psychological and social factors do not alter the fact that mute swans are quite destructive of wetland habitats and that their territorial behavior conflicts with other avian species and sometimes with human neighbors.

B. Purpose of Action

The purpose of this action is to determine how to respond to applications for permits to take mute swans under the Migratory Bird Treaty Act (MBTA). In making this decision, the Service's primary goal is to minimize environmental damage done by mute swans in a feasible and cost-effective way, consistent with applicable law. Secondary goals include reducing the impacts of mute swans on wetland habitats and native species of fish and wildlife, reducing the threat that mute swans pose to human

health and safety, reducing damage to commercial agricultural crops, and retaining a small-but-viable population of mute swans in the Atlantic Flyway for the aesthetic enjoyment of the public. This analysis supports a decision on Maryland's 2003 permit application and other anticipated applications, implementation of U.S. Fish and Wildlife (USFWS) policy (Gould 1998) regarding management of mute swans on national wildlife refuges, and implementation of actions in support of the Atlantic Flyway Mute Swan Management Plan (Atlantic Flyway Technical Committee 2003).

C. Need for Action

1. Requests for Federal Migratory Bird Permits

The principal need for this action is the immediate and future receipt by the Service of applications from Federal land managers, State wildlife agencies, and other cooperators for Federal migratory bird permits to take mute swans. Many States have a long history of management efforts to control mute swan populations, and with the mute swan now Federally protected, there is a desire on their part to continue these actions. Lethal take, egg addling, pinioning and sterilization, or live-trapping and relocation of mute swans can now be undertaken only after an application has been reviewed by the Service and a permit authorizing the requested action(s) has been issued. Since mute swans were not considered to be Federally protected prior to December 28, 2001, this is a new responsibility for the Service. The Service issued 54 depredation permits authorizing the take of mute swans in the Atlantic Flyway in calendar year 2002, and in calendar year 2003 had issued 46 such permits as of May 22–on which date a decision was made to withhold action on additional permits until an Environmental Assessment could be completed assessing the effects of such permits.

2. Detrimental Impacts of Mute Swans

a. Wetland Habitats

Mute swans feed almost exclusively on submerged aquatic vegetation, or SAV (Ciaranca et al. 1997). SAV is a collective term used to describe a variety of aquatic plants and algae that grow in freshwater and estuarine environments. SAV support incredibly diverse communities of freshwater and marine organisms. SAV beds are the lifeblood of aquatic ecosystems. They provide aquatic nurseries, protective habitats where the young of commercially and recreationally important shellfish and finfish can live in relative security from predators while maturing into adults. Mute swans have been documented feeding on at least 23 species of SAV (Table 1),

including 16 species of pondweeds–sometimes referred to as "grasses"--and 7 species of algaes (Willey and Halla 1972, Ciaranca et al. 1997).

In coastal Sweden, Mathiasson (1973) calculated that 45 mute swans consumed 8,635 kilograms (18,997 pounds) of sea lettuce (*Ulva* sp.) during a 45-day period, or about 4.3 kilograms (9.4 pounds) per swan per day. In Rhode Island, penned mute swans ate 3.8 kilograms (8.4 pounds, wet-weight) of aquatic vegetation per day (Willey and Halla 1972).

In the Chesapeake Bay, Fenwick (1983) determined that male mute swans ate 34.6 percent of their body weight per day, while females ate 43.4 percent; applying these figures to average mute swan body weights (from Section IV.C.3.d), we calculate that males and females consume 3.73 kilograms (8.2 pounds) and 3.65 kilograms (8.0 pounds), respectively, of aquatic vegetation in an average day. Assuming that the average mute swan in the Chesapeake Bay eats 3.65 kilograms (8.0 pounds) of submerged aquatic vegetation (SAV) per day, then we can project that the current population of 3,600 birds consumes 4.8 million kilograms (10.5 million pounds, or 5.3 thousand tons) of submerged aquatic vegetation over the course of a year; this represents about 10.5 percent of the total biomass of submerged aquatic vegetation in the Bay.

The quantity of SAV eaten by mute swans is only part of the problem. Additional losses occur through the foraging behavior of mute swans. Their consumption of immature seeds, removal of SAV biomass before plant maturation, and uprooting of whole plants may have a very negative effect on the availability of SAV with minimal consumption (M. Naylor, Maryland DNR, personal communication to Mute Swan Task Force). Because adult mute swans tend to paddle and rake the substrate to dislodge food for themselves and their cygnets (Ciaranca et al. 1997), much vegetation (perhaps as much as an additional 9.1 kilograms [20 pounds] per day per swan) is destroyed and uprooted that is not eaten (Gilham 1956, Willey 1969, Chasko 1986). Mute swans also use large amounts of vegetation for nest building (Gilham 1956).

When present in high concentrations, mute swans can over-graze an area (Cobb and Harlan 1980), after which they abandon it (Allin et al. 1987). The findings of a recent exclosure study in Rhode Island (Allin and Husband 2000) indicated that mute swans can over-graze SAV when water depths are shallow (0.5 meters, or 1.5 feet), often reducing SAV biomass by as much as 92 to 95 percent. In Connecticut, overgrazing of SAV was most severe in the smaller ponds used by breeding pairs, but not

evident in larger areas (Chasko 1986).

In the Maryland portion of the Chesapeake Bay, Hindman and Harvey (2003) cited reports of mute swans overgrazing SAV beds in local areas, and the concerns of residents about the loss of SAV habitat and its impact on populations of blue crab (*Callinectus sapidus*) and fish. Elsewhere in the Chesapeake Bay, recent attempts to restore eelgras (*Zostera marina*) beds by the Virginia Institute of Marine Science have been met with increased feeding activity on those new SAV beds by mute swans, resulting in a significant loss of eelgrass plants (M. Naylor, Maryland Department of Natural Resources, personal communication to Atlantic Flyway Council 2003).

In the Netherlands, Nierheus and Van Ierland (1978) noted that foraging mute swans accounted for 87 percent of the eelgrass (*Zostera marina*) consumed by birds. Elsewhere in Europe, Reichholf (1984) found that Mute swans removed about 20 percent of the available vegetation from within their breeding territories.

In closed waterways in Europe, it has been demonstrated that mute swans are capable of eliminating entire species of SAV from a community (Gillham 1956, Jennings et al. 1961, Mathaisson 1973, Chairman 1977, Neirheus and van Ierland 1978, Scott and Birkhead 1983). The interagency Chesapeake 2000 Agreement includes a commitment to restore 114,000 acres of SAV. But restoration efforts, particularly in the mid-Bay where SAV decline is most severe, are frequently obstructed by feeding mute swans.

b. Native Species of Fish and Wildlife

(1) Indirect Impacts

Overgrazing can cause a functional reduction of aquatic habitat, adversely affecting the food web (Krull 1970, Allin 1981). As an example, the 4.8 million kilograms (10.5 million pounds, or 5.3 thousand tons) of submerged aquatic vegetation removed from the Chesapeake Bay by mute swans over the course of a year represents a significant reduction (of about 10.5 percent) in the amount of this resource that would otherwise be available to provide shelter and food for a wide variety of aquatic organisms.

Mute swans increase their feeding rate during spring and summer because more food is required prior to feather molt and egg laying (Wilmore 1974), which probably influences the availability of SAV to fall migrant waterfowl. During winter, mute swans probably consume nutrient storage overwintering structures (tubers) which probably has a long-term impact on macropyte availability and species composition. Thus, mute swans can reduce the availability of certain wetland plant species, which can ultimately reduce the carrying capacity of wetlands for native waterfowl (Long Point Waterfowl and Wetlands Research Fund, no date).

Kantrud (1990 and 1991) has thoroughly reviewed the importance of two species of SAV–sago pondweed (*Potamogeton pectinalis*) and wigeongrass (*Ruppia maritima*)–in the functioning of wetland ecosystems in North America, including their critical role as important food sources for a variety of waterfowl species.

SAV provides important habitat for a myriad of animal species, and foraging activities of mute swans alter the structure of SAV beds in qualitative or quantitative ways that make them less suitable for the many organisms that depend on this habitat. The varied structure of the SAV beds provide estuarine-spawning fish (e.g., shad, herring, and rockfish) and other marine organisms (e.g., oysters and blue crabs) and their offspring with protection from predators. Any alteration or destruction of the SAV beds–such as can be inflicted by foraging mute swans–would diminish their value for these commercially important species (Krull 1970, Hurley 1991).. The density of juvenile blue crabs, for example, has been shown to be 30 times greater in SAV beds than in unvegetated areas of the Chesapeake Bay (Maryland DNR 2003).

(2) Direct Impacts

Because of their strong territorial nature, mute swans occupy and defend large (up to 6-hectare, or 15-acre) parcels of wetland habitat during nesting, brood rearing, and foraging (Birkhead and Perrins 1986, Ciaranca 1990, Ciaranca et al. 1997), and some pairs will vigorously defend nest or brood sites from intrusion by other species of waterfowl (Anderson and Titman 1992). Not only can they attack and displace native waterfowl from breeding and staging areas (Willey 1968, Reese 1975, Ciaranca 1990, Ciaranca et a. 1997), they have also been known to kill intruding birds of other species and

their young (Stone and Masters 1970, Reese 1980, Kania and Smith 1986).

Mute swans have been reported to cause nest abandonment in Common Terns (*Sterna hirundo*), Forster's Terns (*S. forsteri*), Least Terns (*S. antillarum*), and Black Skimmers (*Rynchops niger*), (Ciaranca et al. 1997, Therres and Brinker 2003). This aggressive territorial defense by mute swans–an adaptive mechanism to ensure the availability of food resources needed to support their offspring–is clearly detrimental to native birds and wildlife.

In central New York, three pairs of captive mute swans killed at least 50 ducks and geese (mostly young birds) on a small zoo pond over a 20-month period (New York Department of Environmental Conservation 1993). In Maryland, mute swan breeding pairs have been documented killing mallard (*Anas platyrhynchos*) ducklings, Canada goose (*Branta canadensis*) goslings, and cygnets of other mute swan pairs (Maryland DNR, unpublished data).

Mute swans are believed to pose a significant threat to the well-being of tundra swans (*Cygnus columbianus*) wintering in the Chesapeake Bay (W. J. L. Sladen, Swan Research Program of Environmental Studies at Airlie, Virginia; personal communication to Maryland Mute Swan Task Force). The eastern population of the tundra swan winters in the mid-Atlantic region from New Jersey to South Carolina (Limpert et al. 1991). Tundra swans have declined in the Chesapeake Bay region since the late 1960's (Limpert and Earnst 1994) and declined in Maryland about 30 percent over the last 25 years (Maryland DNR, unpublished data). The time period during which tundra swans have remained at lower levels in Maryland coincides with the rapid increase in mute swan numbers in that State. Mute swan pairs have been observed exhibiting aggression toward wintering tundra swans, driving them from foraging areas and protected coves used for winter shelter (Larry Hindman, Maryland Department of Natural Resources, personal communication to Atlantic Flyway Council 2003). If mute swans were to adapt to upland feeding behavior (see below), there may be a potential for further interaction with wintering and staging tundra swans in the Mid-Atlantic States (Atlantic Flyway Council 2003).

One of the more dramatic instances in which mute swans have displaced native species was documented in Dorchester County,

Maryland (Therres and Brinker 2003). Over a period of six years (1987 to 1983), an annual molt-gathering of up to 600 mute swans caused repeated reproductive failures in, and ultimately the abandonment of, the largest colony of least terns in the State (accounting for 49 percent of the Statewide population) and one of only two known colonies of black skimmers in the Maryland portion of the Chesapeake Bay. In this instance, mute swans simply out-competed the smaller birds for space on the sand and oyster-shell bars and beaches used by the terns and skimmers for nesting, presumably trampling their nests, eggs, and chicks. Both of these species are listed as threatened by the State of Maryland (Maryland DNR 2001).

c. Nuisance Problems

(1) Commercial Agriculture

Mute swans have reportedly been responsible for several thousand dollars worth of damage to commercial cranberry crops in New Jersey and Massachusetts, the damage being inflicted while the birds were foraging on aquatic plants (Atlantic Flyway Technical Committee, unpublished data). In Maryland, small numbers of mute swans have been observed feeding on turf grass and rye grass crops in areas where the availability of SAV was considered to be limited (Larry Hindman, Maryland DNR, personal communication to Atlantic Flyway Council 2003).

In England, Mute swans commonly feed in field crops adjacent to wetlands. Concerns about their economic impacts to European agriculture have elicited attention (McKay and Parrott 2002).

(2) Human Health and Safety

Territorial mute swans sometimes direct their aggression toward humans who approach too closely to the nest and/or young. With their 2-meter (6-foot) wingspan, they are capable of breaking bones and severely injuring the unlucky recipient. The aggressive behavior of these large birds can pose a safety risk, especially to small children and persons in the water or in small watercraft. Although the potential for injury is low, this display of aggressive behavior elicits fear in the many people who have been subjected to it and may interfere with their subsequent use and enjoyment of coastal

habitats and the many recreational opportunities they provide.

Allin (1981) reported on mute swans attacking humans. Swan attacks have been known to result in the capsizing of canoes and small fishing boats, throwing their occupants into the water (Baird, no date). North Carolina had two reported incidences of mute swan attacks on people during 2001, requiring one person to seek medical treatment (Dennis Luszcz, North Carolina Wildlife Resources Commission, personal communication to Atlantic Flyway Technical Committee). Min Huang (Connecticut Department of Environmental Protection, personal communication to Atlantic Flyway Technical Committee) reported four documented incidents of mute swans attacking people since 2001. An attack on an 81-year-old woman resulted in 31 stitches and the failure of her pacemaker. The following year, the same pair of swans attacked her again. There have also been reported incidents of a mute swan attacking a small dog chained to its doghouse, which was situated within the birds' territory (Charles Allin, personal communication to Atlantic Flyway Technical Committee).

(3) Water Quality

Individual mute swans are subject to infection by a host of microbial diseases (Ciaranca et al. 1997), but there is no evidence that these provide any particular threat to humans. Mute swan excrement can be a source of *Cryptosporidium*, *Giardia*, and coliform bacteria (Medema et al. 1999) but, relative to other factors, is probably not a significant pollution problem. Of greater concern is the role that mute swan foraging behavior–uprooting plants and stirring the bottom with its feet–has in introducing suspended sediments into the water column. By removing mass quantities of SAV, mute swans may also have the indirect impact of reducing dissolved oxygen levels in the water, thereby reducing the quality of the habitat for fishes and other aquatic organisms.

D. Relationship of this Environmental Assessment to Other Environmental Documents

1. Background on this Environmental Assessment

On April 4, 2003, the U.S. Fish and Wildlife Service (USFWS or Service) determined that the issuance of Federal depredation permits for the take of mute

swans in calendar year 2003 was a "categorical exclusion" as provided for by the National Environmental Policy Act (NEPA) and that no further NEPA documentation was necessary (Millsap 2003). On March 13, 2003, the Maryland Department of Natural Resources (MDNR) applied for, and on April 17, 2003, the Service issued, a depredation permit to take 1,500 mute swans. The MDNR initiated control actions upon receipt of their permit, and by early May 2003 had killed approximately 100 birds. In response to a court challenge, the Service requested, on May 16, 2003, that the MDNR surrender their permit. The MDNR agreed to that request, and announced that all mute swan control activities would cease effective May 17, 2003. The Service immediately began evaluating the environmental consequences of a range of alternatives–including the issuance of depredation permits–for managing mute swan populations and the damages they can inflict on wetland habitats, native species, and human health and economic interests, hence the need for this EA.

2. Related Environmental Documents

A policy statement on the management of mute swans in New York State was adopted in 1993 by the New York Department of Environmental Conservation (1993).

Prompted by growing concern for the impacts that mute swans were having on habitats important to migratory birds, the Atlantic Flyway Council (1997) approved and adopted, on August 1, 1997, a policy to control mute swans in the Atlantic Flyway. This policy, which endorsed eight actions that State agencies were encouraged to employ, is incorporated into this EA as Appendix A. The Atlantic Flyway Council is an administrative body comprised of 23 State and Provincial wildlife agencies that was organized in 1952 for the purpose of managing migratory gamebird populations, including waterfowl.

A position statement of the Vermont Fish and Wildlife Department dated August 5, 1997, stated their policy of preventing the establishment and expansion of mute swans in the State. A second position statement adopted by the Department on August 31, 1998, prohibited captive mute swans from being sold or given away in the State.

A memorandum dated March 24, 1998, from the Acting Director of the Service to all Regional Directors acknowledged the ability of mute swans to cause the destruction and degradation of wetland habitats on national wildlife refuges and directed refuge managers to take effective steps to control mute swans on lands under their jurisdiction. This memorandum (Gould 1998) is incorporated into this EA by reference.

On February 3, 1999, President Clinton signed Executive Order (EO)13112 on Invasive Species (64 Federal Register 6183, February 8, 1999). The EO defined invasive species and outlined actions that Federal agencies should take to control the introduction and spread of invasive species in the U.S. The mute swan meets the EO's definition of an invasive species (i.e., "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health").

In a court case decided December 28, 2001, the U.S. Court of Appeals for the District of Columbia Circuit Court ruled that, as a "swan" and a member of the family "Anatidae," as those two terms are used in the migratory bird conventions with Canada and Mexico, the mute swan was Federally protected under the MBTA (16 U.S.C. §§ 703-712).

In February 2002, the Service prepared an information leaflet for Federal, State, and other partners on Federal protection of the mute swan. The leaflet reviewed the legal background, immediate and long-term consequences of Federal management, and permitting requirements. Management options mentioned included development of management plans, establishment of hunting season frameworks, issuance of depredation permits, and establishment of a depredation order (Williams 2002).

On April 25, 2002, the Acting Chief of the Service's Division of Migratory Bird Management issued a memorandum (Allen 2002) to the Regional Migratory Bird Chiefs concluding that the anticipated issuance of 250 depredation permits for mute swans during calendar year 2002 for an estimated maximum take of 2,500 birds would be a continuation of the historic level of management by State agencies and that those permits therefore qualified for a "categorical exclusion" under NEPA.

In 1998, the Maryland Mute Swan Task Force was assembled through a joint effort of the Maryland DNR Secretariate and the Maryland Waterfowl Advisory Committee. The Task Force's comprehensive summary of existing scientific knowledge about mute swan ecology and population dynamics, and of management recommendations, was finalized in January 2001 and made available to the public for comment February 1, 2001 (Maryland Mute Swan Task Force 2001). This document is incorporated into this EA as Appendix B. The culmination of a methodical 5-year planning effort took place on April 14, 2003, when the Maryland Department of Natural Resources released its Mute Swan Management Plan (Maryland DNR 2003) following a 9-month review–including extensive public comments–of a draft plan (Maryland DNR 2002). The plan is incorporated into this EA as Appendix C.

On May 16, 2003, the Mute Swan Ad-Hoc Committee of the Atlantic Flyway Technical Committee's Snow Goose, Brant, and Swan Committee circulated a draft Mute Swan Management Plan for review by each of the 17 State wildlife agencies in the Atlantic Flyway. The draft Plan, which proposes "acceptable population levels" for each State, is scheduled for discussion at a meeting of the Atlantic Flyway Council in July 2003. The draft Atlantic Flyway Mute Swan Management Plan (Atlantic Flyway Technical Committee 2003) is incorporated into this EA as Appendix D.

E. Scope of Analysis

1. Actions Analyzed

The EA evaluates the effects of different management alternatives to minimize damage caused by feral mute swans to wetland habitats, native fish and wildlife populations, personal property values, agricultural resources, fisheries resources, and human health and safety.

2. Period for Which this EA is Valid

The actions implemented following the EA reviews and NEPA decision-making process will remain valid until the Service determines that new needs for action or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document will be reviewed and revised as necessary. This EA will be reviewed each year to ensure that it is complete and still appropriate for the scope of the Service's mute swan permitting activities.

3. Location of the Action

This EA analyzes the potential impacts of mute swan management alternatives on wetland habitats, non-target native wildlife, and human health and safety–and of various management actions to minimize those impacts–in the following 17 States in the Atlantic Flyway: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, West Virginia, Maryland, Delaware, Virginia, North Carolina, South Carolina, Georgia, and Florida. Given its legal status as a migratory bird, assessment of mute swan populations throughout the Atlantic Flyway is deemed to be the appropriate level of analysis, as the issues surrounding mute swans and their management are similar throughout the Flyway. Because individual mute swans rarely travel more than 30 miles from one season to the next (Maryland DNR 2003), birds in the Atlantic Flyway constitute a metapopulation (as that concept is applied by Esler 2000) that is effectively isolated from populations in

the Mississippi Flyway and elsewhere. The principal concentration of mute swans in the Atlantic Flyway resides along the northeast Atlantic Coast from Massachusetts south to Virginia, but other smaller, disjunct populations occur throughout the remainder of the Flyway. The Atlantic Flyway incorporates all or part of two USFWS administrative regions: Region 4 (the Southeast) is represented by the four States bordering the Atlantic Ocean (Florida, Georgia, North Carolina, and South Carolina), while Region 5 (the Northeast) is incorporated in its entirety from Maine to Virginia. To date, requests for depredation permits to take mute swans in the Atlantic Flyway have been restricted to States in USFWS Region 5.

F. Authority

The principal Federal authority for the actions analyzed in this EA is the Migratory Bird Treaty Act (MBTA) of 1918, as amended (U.S.C. 703-711; 40 Stat. 755). The Service is the Federal agency with primary statutory authority for the management of migratory bird populations in the United States.

The MBTA provides strong measures for the protection and conservation of migratory birds, while at the same time providing opportunities for people to use the migratory bird resource for sport, recreation, and scientific endeavors. The MBTA also provides considerable management flexibility for dealing with situations where birds may come into conflict with human interests, as in the case of mute swans.

Regulations implementing the MBTA are published in the Code of Federal Regulations. A whole section devoted to the control of depredating birds is found in Subpart D of Part 21 of Title 50 of the Code (Office of the Federal Register 2002). In Section 21.41 of Title 50, for example, the U.S. has established procedures specifically relating to the issuance of permits for the control of depredating birds. The section discusses permit requirements, applicant procedures, additional conditions, and the tenure of permits.

G. Decisions to Be Made

Based on existing populations of mute swans within the Atlantic Flyway, the decisions to be made are:

- Should the Service continue to issue depredation permits for mute swans? If yes, subject to what limits?

- If not, how should the Service fulfill its statutory responsibility for managing mute swan populations in cooperation with other Federal and State agencies?

- Will the proposed action alternative have significant impacts requiring preparation of an Environmental Impact Statement?

II. PUBLIC INVOLVEMENT

A. Public Contacts

To date, there has been no formal opportunity at the Federal level for the public to comment on cooperative efforts by the Service and State wildlife agencies to minimize the damage caused by mute swans by reducing populations locally and Flyway-wide. Although this EA provides the first opportunity for the public to comment on the Service's proposed action, there was considerable public involvement in the State of Maryland during the development of its Mute Swan Management Plan (Maryland DNR 2003), which would be one of the State programs implemented by the action proposed in this EA. In that process, about 800 written comments were submitted during a 30-day public comment period (January 31 to March 1, 2001) on the Mute Swan Task Force Recommendations, and another 300 written comments were submitted during a 60-day public comment period (July 18 to September 20, 2002) on the draft Statewide Mute Swan Management Plan.

B. Scope of Issues

A sense of the issues surrounding mute swans and the proposed action can be gleaned from the report prepared by the Maryland Mute Swan Task Force (2001). The Task Force identified seven primary issues in the State of Maryland:

(1) Mute swans are inherently valuable because of their aesthetic qualities,
(2) Mute swans impact wetland habitats and native (including State-listed) species,
(3) Mute swans impact water quality,
(4) Mute swans can conflict with humans,
(5) Mute swans are too abundant,
(6) The public is generally ill-informed about mute swans, and
(7) The legal status of mute swans has changed

III. ALTERNATIVES INCLUDING THE PROPOSED ACTION

A. Rationale for Alternative Selection

The Service considered a wide range of alternatives. All alternatives considered were evaluated in relation to their ability to fulfill the requests of Federal, State, and other agencies and organizations for depredation permits authorizing take of mute swans for the purpose of reducing resource conflicts associated with mute swans, while maximizing management flexibility and maintaining a viable population of mute swans in the Atlantic Flyway. NEPA regulations require the analysis of a No Action alternative. Alternatives were developed after reviewing previous mute swan control actions, internal meetings and discussions, and reviewing the best available scientific information. Each alternative described below is analyzed in more detail in Chapter V, ENVIRONMENTAL CONSEQUENCES.

A. Principal Alternatives

1. Alternative 1: No Action

The Service would cease issuing depredation permits for any action (lethal control, egg addling, or other non-lethal control–such as capture and removal) designed to control mute swan populations in the Atlantic Flyway. Because lethal control and egg addling can be conducted only under authority of a permit issued by the Service, this alternative would essentially halt all efforts by State agencies to limit mute swan population growth and reproductive success and to reduce and maintain swan population at pre-determined levels to minimize detrimental impacts. State agencies would still retain the discretion of employing some non-lethal control activities that do not require issuance of a Federal permit, but these are known to have limited effectiveness (i.e., they would not limit the growth of the mute swan population).

2. Alternative 2: Integrated Population Management (Proposed Action)

Integrated management of mute swans would employ a suite of lethal and non-lethal methods. Lethal methods would include direct shooting with firearms, and live-trapping followed by quick and merciful killing using any of several of techniques–gunshot, cervical dislocation, or carbon dioxide asphyxiation (Rhoades 2002). Egg addling would be employed to suppress reproductive success. Non-lethal methods would include pinioning and sterilization, harassment, exclusion, behavioral modification, and relocation. Rockwell et al. (1997) found that actions taken to increase the mortality rate of adult lesser snow geese (*Chen caerulescens*) would be the most effective way to reduce the

size of the overabundant Mid-Continent population. Removal of adult mute swans by shooting or euthanasia would likewise provide immediate results in reducing populations because it would increase the one demographic factor most likely to influence population growth–the adult mortality rate. Lethal control may be controversial among some segments of the public and costly to State wildlife agencies in the short-term. Of the four alternatives considered, this is the only one which would be immediately effective in reducing mute swan populations, a stated goal of the draft Atlantic Flyway Mute Swan Management Plan (Atlantic Flyway Technical Committee 2003), to minimize the environmental impacts that can be caused by overly large populations of swans. It is also the only alternative that would effectuate the Service policy to protect wildlife habitats on national wildlife refuges from further degradation by mute swans and promote the welfare of native wildlife.

This alternative would be implemented by the Service through the issuance of depredation permits to other Federal and State wildlife agencies, national wildlife refuge field stations, and other cooperators following procedures outlined in 50 CFR 21.41 (Depredation Permits). The effect of individual applications would be evaluated in relation to Statewide, and Flyway-wide populations and the population targets stated in the Atlantic Flyway Mute Swan Management Plan (Table 2). The desired proportional reduction in mute swan populations will vary from State to State. In States at the edge of the existing range, the goal may be to entirely eliminate feral populations of the mute swan, an action consistent with the reducing the Flyway-wide population and preventing further geographic expansion (Atlantic Flyway Technical Committee 2003). This EA will be reviewed each year to ensure that it is complete and still appropriate for the scope of the Service's mute swan permitting activities throughout the Atlantic Flyway.

Under this alternative, the impacts to mute swan populations of issuing depredation permits would be monitored by means of the Mid-Summer Mute Swan Survey conducted every three years, most recently in 2002 (Atlantic Flyway Technical Committee 2003); and the annual Mid-Winter Waterfowl Survey; supplemented with information from the North American Breeding Bird Survey (U.S. Geological Survey 2001) and the Christmas Bird Count (National Audubon Society 2003). Available information on the status of the Atlantic Flyway Mute Swan population would be assessed annually to determine any need for further NEPA analysis or adjustment of the permit process.

3. Alternative 3: Egg Addling

This alternative relies on the same scientific evidence as that supporting Alternative 2, the major difference being that lethal take (shooting and euthanasia) of adults and cygnets would not be authorized. Egg addling enjoys fairly widespread support as a suitable and humane technique for suppressing production of young. Two distinct methods are employed: (1) vigorously shaking the egg or puncturing a small hole in the shell and stirring the contents to physically destroy the developing embryo; or (2) spraying a 100 percent food-grade corn oil on the surface of the egg to clog the pores on the eggshell and prevent the exchange of oxygen through the shell membrane, thus suffocating the embryo. One of these techniques is applied to each egg in a clutch, the eggs remain intact, and the nest is otherwise not destroyed. The female continues to tend the eggs for the duration of the normal incubation period, the eggs ultimately fail to hatch, and reproductive success of the pair is suppressed for the year. In addition to egg addling, this alternative would also allow the employment of a variety of non-lethal control techniques.

4. Alternative 4: Non-Lethal Techniques

This alternative relies on the same scientific evidence as that supporting Alternatives 2 and 3, the difference being that lethal take (shooting and euthanasia) of adults and cygnets and egg addling would not be authorized. A variety of non-lethal control techniques are available for addressing site-specific depredation problems, and are acceptable to most segments of the American public. These include (1) harassment techniques (e.g., cracker shells, cannons, pyrotechnics, sirens, balloons, streamers, etc.), (2) exclusionary devices (pens, netting, etc.), (3) behavioral modification, and (4) live-trapping and relocation. Birds tend to habituate quickly to harassment techniques, so a variety of devices must be used in concert to extend their effectiveness. Materials for exclusionary devices (such as netting, wiring, and poles) may be expensive to purchase, and their erection and maintenance is labor-intensive and time-consuming. Exclusionary devices are also subject to wear and tear from the elements, so may have to be replaced annually or more frequently; they may also precude the use of these habitats by native species. Behavioral modification, which generally employs some form of aversive conditioning, may be effective in averting conflicts between aggressive swans and humans in localized situations, but they are generally time-consuming and may not yield the desired results. Pinioning and sterilization of individual birds may be appropriate for very specific situations, but are ineffective and cost-prohibitive over larger areas. The capture and relocation of nuisance birds from one locality to another is often suggested, but is rarely a suitable long-term solution. At best, it only addresses very localized problems involving single birds or pairs of birds.

C. Other Alternatives Considered But Eliminated from Detailed Study

1. Establishment of a Hunting Season

As a gamebird protected by the MBTA, the Service has the authority to propose frameworks for a hunting season on the mute swan, within which individual States would have the option of setting regulations such as bag limits and season length. The Service could unilaterally propose such frameworks or propose them in response to a recommendation from a State agency or Flyway Council, as has been done for mute swans in the Pacific Flyway (Trost et al. 2003). There is strong opposition to a mute swan hunting season from the animal rights community. Even if a hunting season were implemented in the Atlantic Flyway, it is questionable if it would be very effective in reducing mute swan populations or maintaining them at desirable levels. On the other hand, allowing sport hunters to kill mute swans and make use of the meat might be more desirable, and certainly less wasteful of the resource, than burying or incinerating the carcasses, as would normally be done in the preferred alternative. Any proposal to allow hunting of mute swans in the Atlantic Flyway would be the subject of a separate NEPA document.

2. Removal of the Mute Swan from Protection of the MBTA

If mute swans were removed from the protection of the MBTA, responsibility for their management would revert back to the individual State wildlife agencies, resulting in less oversight of the cumulative impacts of management actions on mute swan populations. While this approach would give individual States greater flexibility to deal with local problems in a more aggressive fashion, it could also result in uncoordinated action, with neighboring States achieving varying degrees of success. This alternative could be implemented by either of two ways: (1) challenge the court decision finding that the non-native and invasive mute swan is protected under the MBTA, or (2) revise the MBTA and the underlying bi-lateral conventions to specifically exclude non-native and invasive species such as the mute swan. This option would be time-consuming, there is no guarantee that either approach would be successful, and there might be opposition from some segments of the American public. The Service is not pursuing this alternative at present because of time constraints, but may elect to pursue this course in the future.

3. Application of treated Baits

Given the proclivity of mute swans to beg for handouts and to gather in places

where artificial food is provided, it would probably be possible to attract them to bait stations, where they could be drugged with grains or breads treated with drugs such as alphachloralose and then captured and euthanized. This alternative would probably not be acceptable to some members of the American public.

4. Depredation Order

Depredation orders can be implemented to authorize Federal and State agencies and other cooperators broader discretion and authority to determine when lethal take of mute swans might be necessary and to implement lethal take without need of obtaining a depredation permit from the Service. A depredation order would give Federal land managers and State wildlife agencies greater flexibility for addressing local and Statewide depredation problems in a more effective and timely fashion. The Service is not pursuing this alternative at present because of time constraints.

D. Comparison of Actions by Alternative

ACTIONS	Alt. 1. No Action	Alt. 2. Integrated Management	Alt. 3. Egg Addling	Alt. 4. Non-Lethal Control
Lethal take by shooting and euthanasia	Would not be authorized at any place or any time	Could be authorized by issuance of depredation permit	Would not be authorized at any place or any time	Would not be authorized at any place or any time
Egg Addling	Would not be authorized at any place or any time	Could be authorized by issuance of depredation permit	Could be authorized by issuance of depredation permit	Would not be authorized at any place or any time
Pinioning and sterilization	Would not be authorized at any place or any time	Could be authorized by issuance of special purpose permit	Could be authorized by issuance of special purpose permit	Could be authorized by issuance of special purpose permit
Live-trapping and relocation	Would not be authorized at any place or any time	Could be authorized by issuance of depredation permit	Could be authorized by issuance of depredation permit	Could be authorized by issuance of depredation permit
Harassment techniques	Would not be authorized on national wildlife refuges, but could be conducted elsewhere at discretion of cooperators (no Federal permit required)	Discretionary; no Federal permit required	Discretionary; no Federal permit required	Discretionary; no Federal permit required
Exclusionary devices	Would not be authorized on national wildlife refuges, but could be conducted elsewhere at discretion of cooperators (no Federal permit required)	Discretionary; no Federal permit required	Discretionary; no Federal permit required	Discretionary; no Federal permit required

Behavioral modification	Would not be authorized on national wildlife refuges, but could be conducted elsewhere at discretion of cooperators (no Federal permit required)	Discretionary; no Federal permit required	Discretionary; no Federal permit required	Discretionary; no Federal permit required

IV. AFFECTED ENVIRONMENT

A. Human Environment

Coastal areas are among the most crowded and developed in the nation. This narrow fringe–comprising less than one-fifth of the contiguous U.S. land area–accounts for over one-half the nation's population and housing supply. The population of these areas grew by more than 38 million people between 1960 and 1990, and coastal growth is expected to keep pace with the rest of the nation in the foreseeable future (National Oceanic and Atmospheric Administration, no date).

Nearly a quarter of the U.S. population lives along the Atlantic Coast, where nearly 60 million people lived in 285 coastal counties in 1990. More than two-thirds of this coastal population is part of the "megalopolis" extending from southern Maine through northern Virginia, which includes Boston, Providence, New York City, Philadelphia, and Washington-Baltimore. (National Oceanic and Atmospheric Administration, no date). This "megalopolis" of 43 million people broadly overlaps with the core range of the mute swan.

B. Biological and Physical Environment

The vast majority of the feral mute swans in the Atlantic Flyway occupy a very narrow fringe of habitats–the estuaries, bays, tidal rivers, and associated freshwater and saltwater wetlands–immediately adjacent to the coast, principally from Maine to Virginia. A few swans are found further inland on freshwater ponds, lakes, and rivers, but these represent a negligible part of the population.

A detailed description of the biological and physical environment is beyond the scope of this EA, but a few of the more characteristic fish, birds, and mammals that share these coastal habitats with mute swans are listed in Table 3.

A preliminary list of Federally endangered or threatened species that might co-occur (i.e., occupy the same geographic areas and habitats) with mute swans in their established core range in the Atlantic Flyway is provided in Table 4.

C. Mute Swan

The mute swan is one of seven recognized species of swans, and one of four species known to occur in North America and the U.S. The other three species which occur in the wild are the trumpeter swan (*C. buccinator*), the tundra swan (*C. columbianus*), and the whooper swan (*C. cygnus*). Of these three species, only the tundra swan is likely to come into contact with the mute swan in the Atlantic Flyway.

1. Origin of Mute Swans in the Atlantic Flyway

Mute swans were unknown in that portion of the U.S. now encompassed by the Atlantic Flyway until sometime just prior to 1900, when they were intentionally introduced by humans. Long (1981:37) summarizes what is known about the early history of mute swans along the northeast Atlantic Coast of the U.S.:

> The original introductions probably occurred as semi-domestic birds in eastern North America (Delacour 1954), but there appears to be no record of when the species was first imported. Some were imported in 1910 (216 birds) and in 1912 (328), but earlier specimens are apparently known there. According to Bump (1941) they were released by private individuals in New York State prior to 1900.
>
> They were established on the Lower Hudson and on Long Island, New York, in a semi-wild state before 1928 (Phillips 1928). Here, they were reported to have been accidentally liberated and in 1920 numbered some twenty-six birds (Cook and Knappen 1941). Unpinioned White Swans kept on estates at Newport, Rhode Island, are believed to have been responsible for a population which increased and spread rapidly from the 1950s. Some were released at Oakdale, Long Island (Cooke and Knappen), and the population there by 1967 numbered about 700 birds (Palmer 1976). In New Jersey, a number of feral birds were established by 1940 and they nested there in the 1950s. These had built up to a population of some 188 birds by 1957.

The Chesapeake Bay population originated from five pinioned birds that escaped from a private waterfront estate along the Miles River in Talbot County, Maryland, in 1962 and nested successfully (Reese 1969). By 1980, the population had increased to more than 400 birds concentrated mainly in the tidal waters of Talbot County. During the mid-1980's, the breeding population was distributed primarily in the mid-Eastern Shore section of Maryland, especially in Eastern Bay, the Choptank River, and the mouth of the Chester River. Some breeding was documented along the bay shoreline in Dorchester County and some observations were made on the western side of the bay in

Maryland. By 1999, the population had increased to 3,955 birds (Maryland DNR, unpublished data). Fofonoff et al. (1998) classified the mute swan as an exotic species with serious, but localized, impacts to native species in the Chesapeake Bay watershed.

2. History of Protection in the Atlantic Flyway

Mute swans were not recognized as being Federally protected in the U.S. prior to December 28, 2001. Hence, any protection that they received prior to that date would have been bestowed upon them by individual State legislatures. As of 1996, mute swans had been granted legal protection in just 12 States, including five in the Atlantic Flyway (Maine, Rhode Island, Connecticut, New York, and West Virginia), two in the Mississippi Flyway (Illinois and Ohio), four in the Central Flyway (Colorado, Kansas, Nebraska, and Wyoming), and one in the Pacific Flyway (Washington); 10 States (Maine, Massachusetts, New York, Michigan, Minnesota, Colorado Wyoming, Alaska, Nevada, Washington) required permits to take, release, or relocate mute swans; two States (Delaware and Michigan) recognized the mute swan as an exotic; and Washington recognized it as deleterious (Nelson 1997).

3. General Biology

a. Distribution

There are three major established breeding concentrations in North America: (1) the northeast Atlantic Coast population from New Hampshire south to eastern Virginia; (2) the Great Lakes population from northern Wisconsin, northern Michigan, and southern Ontario south to Illinois, northern Indiana, northern Ohio, and western Pennsylvania; and (3) the northern Pacific Coast population in southern British Columbia and northern Washington. There may also be scattered groups of swans outside these established concentrations.

b. Migration

Mute swans are essentially sedentary, with marked birds rarely moving more than 30 miles from the site where originally banded (Maryland DNR 2003). Daily, seasonal, and annual movements tend to be local, and are influenced by changes in abundance and location of food supplies, snow and ice cover, and tidal fluctuations. Willey (1968) reported on the seasonal movement of Rhode Island-banded mute swans into Massachusetts, Connecticut, and New York. Ciaranca (2000) further

noted that seasonal movements in southeastern Massachusetts were related to coastal configurations and the following of watercourses inland.

c. Habitats

The mute swan requires habitats with shallow shorelines that have ample submergent and emergent vegetation. In the northeastern U.S., it prefers coastal ponds (salt, brackish, and fresh-water), estuaries, backwaters, and tributaries of embayments. It occupies these habitats year-round (Ciaranca et al. 1997). As the northeast Atlantic Coast population has grown, some birds have begun to occupy inland freshwater wetlands, ponds, impoundments, and reservoirs (Maryland DNR 2003). In the Great Lakes region, it prefers ponds; bogs; large, slow-moving rivers; and creeks and streams that empty or flow into larger bodies of water (Ciaranca et al. 1997).

d. Diet

Mute swans are almost totally herbivorous, feeding on a variety of aquatic vegetation, including leaves, stems, roots, stolons, and rhizomes (Ciaranca et al. 1997). For example, their diet in the Chesapeake Bay consists of 81.8 percent submerged aquatic vegetation, 8.4 percent algae, 8.3 percent emergent and terrestrial plants, and 0.3 percent animal matter (Fenwick 1983). In the northeastern U.S., they have been documented to feed on at least 16 different species of pondweeds and 7 species of algae (Willey and Halla 1972, Fenwick 1983, Ciaranca et al. 1997).

e. Foraging Behavior

Mute swans employ three behaviors when feeding: (1) Dabbling, in which the bill is held horizontal along the water surface and food items are skimmed or sieved into the mouth; (2) Dipping, in which the head and neck are submerged below the surface; and (3) Upending, in which the whole body except the tail and feet are submerged. Dipping is generally used in water depths of 20 to 45 centimeters (8 to 18 inches), while Upending is used in water depths of up to 103 centimeters (40 inches, or 3.3 feet) (Ciaraca et al. 1997).

f. Body Weight

Mute swans exhibit much individual variation in body weight, which can be attributed largely to age, sex, and seasonal differences. But on average,

males weigh about 10.8 kilograms (23.8 pounds) and females weigh 8.4 kilograms (18.5 pounds). Maximum recorded weights are about 14.1 kilograms (31 pounds) for males and 11.3 kilograms (24.9 pounds) for females (Ciaranca et al. 1997). Compared to tundra Swans–the native swan most likely to come into contact with mute swans in the eastern U.S.–male Mutes average about 44 percent heavier than male Tundras, and female Mutes average about 33 percent heavier than female Tundras.

g. Age at First Breeding

The age at which mute swans first breed varies from 2 to 4 years of age (Ciaranca et al. 1997). In the Chesapeake Bay, for example, 53 percent of females breed in their 2nd year, 79 percent in their 3rd year, and 94 percent in their 4th year; males mature at a slightly older age, with 42 percent breeding in their 2nd year, 59 percent in their 3rd year, and 70 percent in their 4th year (Reese 1980).

h. Reproductive Biology

(1) Mean Clutch Size.–The reported mean average clutch size varies from 4.3 to 6.5 eggs per nest (n = 5 studies), with a median value of 5.9 eggs per nest (Ciaranca et al. 1997).

(2) Hatching Success.–The reported mean hatching success varies from 48 to 87 percent (n = 6 studies). On average, about 49 to 54 percent of the eggs laid hatch successfully (Ciaranca et al. 1997).

(3) Mean Brood Size at Fledging.–The reported mean number of young that survive to become fledglings (at 120 to 150 days of age) varies from 2.2 to 5.4 (n = 7 studies), with an average of 3.7 young per brood (Ciaranca et al. 1997).

(4) Egg Survival.–The reported mean percentage of eggs laid that produce fledged young varies from 28 to 60 (n = 7 studies). On average, about 45 percent of all eggs laid produce fledglings capable of flight (Ciaranca et al. 1997).

(5) Nestling Survival.–The reported mean percentage of cygnets that successfully fledge, or reach flight stage, varies from 34 to 82 (n = 6). On average about 53 percent of the cygnets that hatch survive to become fledglings (Ciaranca et al. 1997).

(6) Number of Young Fledged Per Nest - The reported mean number of young fledged (i.e., surviving to flight stage) per nest varies from 0.9 to 3.1 (n = 5), with an average of about 1.8 per nest (Ciaranca et al. 1997).

(7) Annual Reproductive Success.–The proportion of annual nesting attempts that result in the successful fledging of at least one young varies from 36 to 90 percent (n = 5 studies), with an average of about 80 percent (Ciaraca et al. 1997).

i. Adult Survivorship and Longevity

Annual adult survivorship is high, averaging 90 percent or higher (Reese 1980, Gelston and Wood 1982, Ciaranca et al. 1997). Annual survival rates increase with age. Reese (1980) reported an average post-fledging survival rate of 90 percent to year 1, and a 50 percent survival rate to age 7. Mute swans in Michigan are reported to have a 12 to 16 percent annual mortality rate from fledging to their third year, 2 to 7 percent from 4 to 8 years, and only 2 percent after age 5 (Gelston and Wood 1982). Mute swans are long-lived birds. In North America, the oldest known mute swan in the wild was at least 26 years and 9 months of age (Klimkiewicz and Fletcher 1989); the average, however, is probably much closer to 11 years (Ciaranca et al. 1997).

4. Population Status and Trends

The cumulative evidence (DeSante and Pyle 1986, Nelson 1999, National Audubon Society 2003) indicates that mute swans are known to have occurred–as wild feral birds, captive or semi-captive birds, or escapees–in at least 41 of the 50 States, with evidence of breeding in 19 States, but have populations of more than 200 birds in only 14 States (Table 5). Mute swans are segregated for administrative and management purposes, not because of biological differences, into populations corresponding to the four Flyways used for the management of migratory gamebirds (Atlantic, Mississippi, Central, and Pacific). The populations and growth rates described below for each Flyway below have evolved in the context of various control efforts, such as those described in Section IV.C.5 for the Atlantic Flyway.

Nelson (1996) reported that established breeding populations were increasing at a rate of 6-25 percent annually, and that the introduced population had an overall increase of more than 50 percent over a 10-year period. In the Atlantic Flyway, the population increased at a average annual rates of 1.3 to 8.7 percent,

more than doubling in size from 1986 to 2003, from 5,800 birds to 14,313 birds (Atlantic Flyway Technical Committee 2003); within individual States, overall population growth ranged from -7.8 to 1,273 percent over this same time period (Table 2). These increases in population have occurred despite active population control programs in many of the States where swans are most numerous. Standardized trend data from the Breeding Bird Survey and the Christmas Bird Count suggest annual population trends of 1.2 to 32.5 percent (median 4.6 percent) for the 14 localities sampled (Table 6).

a. Atlantic Flyway

An estimated total of 12,940 mute swans occurs in the U.S. portion of the Atlantic Flyway (Atlantic Flyway Technical Committee 2003). The majority (98.2 percent) of the population is found in USFWS Region 5 (the northeastern U.S.), the remainder in USFWS Region 4 (the southeastern U.S.). The USFWS Region 5 component, better known as the northeast Atlantic Coast population, is the largest of the three established populations in the U.S. An earlier review (Allin et al. 1987) of the history of mute swans in the Atlantic Flyway predicted, based on the 5.6 percent mean annual growth rate indicated by the Mid-Winter Waterfowl Survey, that the population would double by the year 2000. In actuality the Atlantic Flyway Mute Swan population increased by more than 2.2 times by 1999 to over 12,650 birds (Table 5). In 1985, the Atlantic Flyway Council initiated the Mid-Summer Mute Swan Survey (MSMSS) to better understand the status of this species. The survey is conducted every third year during the mid-July through mid-August molt period. The first MSMSS was completed in 1986 and thereafter during 1989, 1993, 1996, 1999 and 2002. A higher-than-expected annual growth rate of 9.2 percent is indicated by both the mid-summer and the mid-winter surveys (Figures 1 and 2). Growth rates since 1986 show regional variation within the Flyway, with populations in southern New England (Massachusetts, Rhode Island, and Connecticut) increasing 25 percent, those in the Mid-Atlantic (Pennsylvania, New York, and New Jersey) increasing 87 percent, and those in the Chesapeake Bay (Maryland and Virginia) increasing 1,116 percent. States on the fringes of the primary range (Maine, New Hampshire, Vermont, Delaware, West Virginia, North Carolina, South Carolina, and Georgia) each reported fewer than 30 feral mute swans living in the wild. The overall growth of the Atlantic Flyway population over this 16-year period was 147 percent, the population being 2.6 times greater in 2002 than it was in 1986. If the current rate of growth continues, the Atlantic Flyway population could potentially double in size every eight years.

b. Mississippi Flyway

The Great Lakes population of the Mississippi Flyway is the second largest, as well as second oldest, of the three established populations. As of January 2000, there were an estimated 6,800 birds in the Mississippi Flyway, including 1,100 in captivity (Joe Johnson, Kellogg Bird Sanctuary and Chair, Mississippi Flyway Technical Section's Swan Committee, unpublished data). About two-thirds (4,700) of the birds reside in Michigan, with another 600 in Wisconsin; there are also small but rapidly growing populations in Illinois, Indiana, and Ohio.

c. Central Flyway

Feral populations are not known to be established in the Central Flyway. The Flyway-wide population numbers fewer than 100 birds. About half of the population is thought to occur in Colorado, where a variable proportion of the total are captive or semi-captive birds (Nelson 1997).

d. Pacific Flyway

The Pacific Flyway population is the smallest of the three established population, with approximately 200 birds residing in Washington (Nelson 1997). This population owes its origin to an expansion of birds introduced into southern British Columbia many years ago. Elsewhere, scattered individuals, pairs, and small groups of mute swans are reported from throughout the Flyway. These most likely represent captive or semi-captive birds, but their status is not well understood.

1. History of Mute Swan Population Control Efforts

a. Prior to December 2001

Through 1996, formal mute swan control programs had been implemented in at least nine States, including six in the Atlantic Flyway (Delaware, Maryland, New Hampshire, New York, Pennsylvania, and Rhode Island), two in the Mississippi Flyway (Ohio and Wisconsin), and one in the Pacific Flyway (Washington); and another five States were considering control measure (Nelson 1997). Additionally, control programs have reportedly been conducted in recent years in Montana (Ciaranca et al. 1997) and Vermont (Petrie 2003).

Since the mid-1970's, various State wildlife agencies in the Atlantic Flyway have conducted some form of population control on mute swans. State policy in Rhode Island allowed egg addling; euthanasia of sick, injured, and nuisance birds; and prohibited the sale, import, and export of birds or their eggs. Between 1978 and 2002, the State destroyed over 10,500 eggs in about 1,700 nests, yet the population increased by over 500 percent (Atlantic Flyway Technical Committee 2003, Petrie 2003).

The States of Delaware, Pennsylvania, and Virginia considered the mute swans to be an exotic, unprotected species. While Pennsylvania and Virginia allowed swans to be harvested, Delaware had aggressively removed birds from State lands. New York established a policy in 1993 that allowed harassment, egg addling, and removal and euthanasia of nuisance birds. As birds spread northward in the Atlantic Flyway, the State of Vermont established a policy in 1997 that called for the total removal of all mute swans from the State. Further prohibiting the importation and sale of birds, Vermont also required that all captive birds be pinioned, marked for identification, and not allowed to reproduce (Atlantic Flyway Technical Committee 2003). Summaries of mute swan policies and control activities in the Atlantic Flyway prior to January 2002 follow.

(1) Connecticut.–Prior to 2002, there were no mute swan population control measures underway in Connecticut. Although the hunting of mute swans is prohibited by law (Section 26-94 C.G.S.), the Commissioner of Environmental Protection has authority to implement control measures for mute swans pursuant to Section 26-3 C.G.S. The Bureau of Natural Resources has established a population objective of approximately 190 birds. This number presumes that (1) swans will be excluded from all high-quality habitats (e.g., Federal, State, and private lands) that are specifically managed for biodiversity, including but not limited to wildlife management areas and natural area preserves, and (2) limited numbers of swans will provide viewing opportunities for the public in habitats of low value to native wildlife (e.g., public parks, large lakes, and private ponds).

(2) Delaware.–The mute swan was listed as an unprotected invasive pest species. As such, mute swans, their nests, and their eggs were routinely removed from State wildlife management areas and (with landowner permission) from private lands since the mid-1970's, and similar actions were encouraged on Federal lands in the State. The

State-sponsored control program was able to keep the population at a very low level by removing approximately 20-35 birds each year and destroying all known nests. The Delaware Division of Fish and Wildlife has a mute swan population goal of zero.

(3) Florida.–All but four of 219 mute swans residing in the State are known to be captive and pinioned. No control efforts were conducted prior to 2002 and none are planned for the future.

(4) Georgia.–No control efforts were conducted prior to 2002 and none are planned for the immediate future. The goal is to limit mute swans to their current population of 250 birds, limit their distribution to private ponds, and prevent their establishment on public waters.

(5) Maine.–The Department of Inland Fisheries and Wildlife took action to prevent expansion of mute swans into Maine by routinely denying requests for the importation and release of birds into the wild. Although there is no Statewide management plan, the population goal would likely be zero.

(6) Maryland.–Mute swans are regulated as "wetland game birds," giving the Maryland DNR authority to regulate the possession, sale, trade, exportation, and importation of mute swans. A Mute Swan Task Force established by the Maryland DNR in 1998 assessed options for dealing with a growing population of mute swans and provided management recommendations (Maryland Mute Swan Task Force 2001). Using the mute swan Task Force report as a scientific foundation, the State prepared a management plan that called for an 86 percent reduction in the size of the Statewide popualtion, from 3,624 birds to 400 birds (Maryland DNR 2003).

(7) Massachusetts.–The management objective is to restrict further range expansion of mute swans in Massachusetts, with a population goal of no more than 1,000 birds.

(8) New Hampshire.–The Fish and Game Department has no formal written policy on mute swans, but considers them to be feral-domesticated waterfowl. They have allowed private ownership of swans provided that adults and progeny did not leave the owner's property and that all captive birds were marked. In 1995, the Department began control efforts to address public safety issues associated with territorial swans and to limit the number and

distribution of mute swans and their impacts on native waterfowl species. In addition to egg addling, adults were removed from public lands and from private lands at the request of the landowner. Since control efforts were initiated, the number of nesting mute swans appears to have stabilized at fewer than 15 birds. The Department's goal is a population of zero birds.

(9) New Jersey.–The Division of Fish and Wildlife did not conduct any population control efforts prior to 2002. The Division generally received 10 or fewer complaints annually regarding mute swans, most of them involving fear of nesting swans aggressively defending their territories. The objective is to reduce the statewide population to 700 swans, with special effort to reduce populations in coastal impoundments managed for migrant and wintering waterfowl.

(10) New York.–A mute swan management policy has been developed (New York Department of Environmental Conservation 1993). Where mute swans have existed for many years, environmental groups, local officials, and residents have advocated control programs. The New York DEC advocates that successful nesting should be prevented wherever conflicts with other wildlife or human activities may occur. Measures that may be used to control swans include harassment, egg shaking, sterilization, and removal. DEC will not allow mute swans to remain or become established on lands that it manages. Properly licensed individuals are allowed to keep, raise, and display mute swans as long as no birds are released or allowed to escape to the wild. New York DEC's suggested goal is to have no more than 1,000 free-flying mute swans in the State by 2010, with no successful nesting in the wild.

(11) North Carolina.–No control efforts were conducted prior to 2002. The current mute swan population does not exceed 25-30 birds. A mute swan policy is being developed, and the desired population goal is expected to be zero birds in the wild.

(12) Pennsylvania.–Pennsylvania has no formal policy on mute swans, and has no regulations restricting their import, export, sale, or release. Historically, the Pennsylvania Game Wildlife Code classified mute swans as non-protected species. The objective for mute swans in the State is zero population growth, no range expansion, and a total statewide population of no more than 250 birds located only on lands not managed for wildlife diversity.

Reduction towards a biologically optimum population of zero is desirable and will be encouraged.

(13) Rhode Island.–Efforts to control mute swan populations have been ongoing since 1976. After addling 10,500 eggs, the population continues to grow at 5.6 percent annually. Although control efforts have remained constant, nest number have increased–mostly due to immigration from neighboring States without active control programs (Ciaranca et al. 1997)–with the result that the estimated number of nests treated annually has declined from 80 percent to 68 percent. Allin (2001) concluded that egg addling, at an annual cost of $8,000, had succeeded in merely slowing the rate of population growth. Effectively managing the current population of 1,500+ birds would require addling the eggs in 90 to 95 percent of all nests at a cost of more than $10,000, a goal that is probably not achievable at current staffing levels. Rhode Island's mute swan population goal is 500 birds.

(14) South Carolina.–No control efforts prior to 2002. The current population numbers less than 30 birds and there are no plans to manage mute swans, although the desired population goal is zero birds in the wild.

(15) Vermont.–Prior to 2002, the policy of the Department of Fish and Wildlife was to remove all mute swans, including nests and eggs, from lands and waters of the State and from other public and private properties with the consent of the landowner. Importation and possession of mute swans or their eggs is now prohibited, but swans held in captivity prior to the adoption of this policy are permitted with certain restrictions. The State seeks to prevent the establishment and expansion of feral populations of the mute swan.

(16) Virginia.–Prior to 2002, the mute swan was listed as an exotic species in Virginia, and some control–including egg addling and removal of adult birds–had been conducted on national wildlife refuges, State wildlife management areas, military installations, and private lands. Mute swans were allowed to be taken during the annual tundra swan hunting season, but few, if any, were actually ever taken.

(17) West Virginia.–West Virginia has a feral wild population of fewer than 20 mute swans and has conducted no control efforts, but prefers

a population of zero free-ranging mute swans.

(18) National Wildlife Refuge System.–Many national wildlife refuges in USFWS Region 5 conducted mute swan control to address habitat degradation and species management issues. Beginning in 1998, these activities were conducted under the guidance of a policy document from the Service Directorate (Gould 1998). This work was conducted under various management plans at these field stations, and was coordinated with the respective State agencies. The work of each field station was coordinated within the overall biological program of the National Wildlife Refuge System within USFWS Region 5. Of 17 national wildlife refuges contacted and responding in early June 2003, 9 reported taking to control mute swan populations from 1993 to 2001, including 5 that reported lethal take of adults and/or cygnets. These five refuges took a grand total of 197 birds over this 9-year period, or about 4 birds per year per refuge (range 0 to 65).

(19) Wildlife Services.–The Wildlife Services program of the U.S. Department of Agriculture's Animal and Plant Health Inspection Service is the Federal agency responsible for addressing problems caused by nuisance wildlife, including migratory birds. Because mute swans were not Federally protected prior to December 2001, individual State agencies usually handled mute swan depredation complaints internally. Hence, Wildlife Service's records on the number of complaints related to mute swans prior to December 2001 is considered incomplete (Pete Poulos, personal communication). According to Bergman et al. (ca. 1990), Wildlife Services received requests for assistance from 19 States to help alleviate damage caused by mute swans during fiscal years 1990 to 1997, including these 10 States in the Atlantic Flyway: Georgia, Maryland, Maine, North Carolina, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Virginia.

b. Since December 2001

Following the December 28, 2001, decision by the U.S. District Court for the District of Columbia that mute swans are protected by the MBTA, several of the mute swan population control techniques (particularly lethal take and egg addling) traditionally employed by State wildlife agencies could be undertaken only if authorized by a permit issued by the Service.

(1) Calendar Year 2002.–In calendar year 2002, the Service issued 66 depredation permits authorizing the lethal take of 1,758 birds (about 10 percent of the known U.S. population), the addling or oiling of all eggs in 2,007 nests, and the relocation of 77 birds in 14 States, 11 in the Atlantic Flyway and 3 in the Mississippi Flyway. Permit holders actually reported taking 248 birds, addling or oiling more than 189 eggs in 35 nests, and relocating 8 birds. See Table 7 for a detailed accounting of depredation control activities within USFWS administrative regions and States.

In the Atlantic Flyway, the authorized take of 1,304 birds represented 9.1 percent of the Flyway-wide population (14,313 birds). All permits were issued in States in USFWS Region 5 (the northern half of the Flyway), where the authorized take represented 9.3 percent of the known population (14,056 birds).

(2) Calendar Year 2003.–As of May 22, 2003–on which date a decision was made to withhold action on additional permits to allow the Service an opportunity to evaluate a range of alternatives for managing mute swans–the Service had issued 66 depredation permits authorizing the lethal take of 3,605 birds and the addling of all eggs in 2,214 nests in 14 States, 11 in the Atlantic Flyway and 3 in the Mississippi Flyway. See Table 8 for a detailed accounting of depredation control activities within USFWS administrative regions and States.

In the Atlantic Flyway, the authorized take of 3,102 birds represents 18.9 percent of the Flyway-wide population (14,313 birds). All permits were issued in States in USFWS Region 5 (the northern half of the Flyway), where the authorized take represents 19.2 percent of the estimated population of 14,056 birds. Excluding the 1,700 birds authorized to be taken in Maryland, the authorized take of 1,402 birds in the remaining States in USFWS Region 5 represents 10.6 percent of the known population (10,432 birds), a figure not unlike the 9.6 percent of the population that was authorized to be taken in calendar year 2002.

In the six States in the Atlantic Flyway in which feral populations of the mute swan are known to have been present and established prior to 1970 and in which the current population approaches at least 1,000 birds (e.g., Connecticut, Maryland, Massachusetts, New Jersey, New York, Rhode Island), authorized take as a percentage of

the known Statewide population ranged from 0.2 (Massachusetts) to 44 (Maryland), with a median of 5.3 percent for all six States (Table 7). The high value for Maryland (44 percent) can be attributed to the implementation of their Mute Swan Management Plan (Maryland DNR 2003).

D. Affected and Interested Parties

The proposed action predominantly affects residents of the 17 States of the Atlantic Flyway, especially those in the 11 States (from New Hampshire and Vermont south to Virginia) where depredation permits have been requested and issued by the Service, 2002-2003. People living elsewhere, but having an active interest and/or direct involvement in mute swan management may also be affected.

A. State Wildlife Agencies and Other Cooperators

The proposed action would directly affect the 11 State wildlife agencies and 35 other cooperators (including Federal agencies) who have expressed an interest in conducting activities to manage mute swan populations.

B. Non-Governmental Organizations and the Public

The positions of some organizations have been determined on the basis of their comments on the draft Maryland management plan or their public statements on the lawsuit filed in The American Bird Conservancy (2,600 members), Chesapeake Bay Foundation (110,000 members), Connecticut Ornithological Society (>500 members), Maryland Ornithological Society (2,400 members), South River Federation, and Trumpeter Swan Society (700 members) have expressed support for the proposed action. The Friends of Animals, Fund for Animals (250,000 members), Humane Society of the United States, Save Maryland's Swans, and Save Our Swans USA are on record as opposing the proposed action.

V. ENVIRONMENTAL CONSEQUENCES

A. Alternative 1: No Action

1. Effects on Mute Swan Populations

In the absence of management actions to reduce and control the mute swan population, it would be expected to continue its current rapid annual rate of population growth of 9.2 percent (Atlantic Flyway Technical Committee 2003) and range expansion. Survey data from the Atlantic Flyway, 1986-2002, show that, if the current rate of growth continues, the mute swan population could potentially double every eight years (Atlantic Flyway Technical Committee 2003). As a further example of the potential consequence of the No Action alternative, consider the Maryland portion of the Chesapeake Bay. Considering the availability of unoccupied coastal wetlands and shoreline habitats, Maryland could potentially provide nesting territories for about 18,140 nesting pairs of mute swans. With non-breeders representing nearly 80 percent of the Maryland population, it is theoretically possible that the Statewide population could approach 100,000 birds (Maryland DNR 2003). It is possible, though by no means certain, that natural mortality factors such as disease or winter starvation–which thus far have not been major limiting factors–might arise to limit the population to some level below that which the nesting habitat would support.

2. Effects on Wetland Habitat

Detrimental impacts to wetland habitats, especially the submerged aquatic vegetation that mute swans eat in large quantities, would continue, and would be expected to increase in direct proportion to increases in the mute swan population. If the mute swan population continued to double every eight years, as predicted in the absence of control efforts, impacts on submerged aquatic vegetation could be devastating. By 2010, mute swans would be consuming 21 percent or more of the SAV biomass annually in their core range. The quality and quantity of SAV would decrease, and large portions of the shallow-water areas of the Chesapeake Bay and other estuaries would be denuded of their SAV beds. Efforts to restore depleted SAV beds would be subverted by continued heavy grazing pressure from increased populations of the mute swan.

3. Effects on Nontarget (Including Threatened and Endangered) Fish and Wildlife

Direct and indirect impacts to nontarget fish and wildlife would continue, and

the severity would be expected to increase in direct proportion to increases in the mute swan population. If the mute swan population continued to double every eight years, as predicted in the absence of control efforts, impacts on nontarget fish and wildlife could be substantial, including such ecologically and recreationally valuable species as the tundra swan and American black duck (*Anas rubripes*). In the absence of mute swan control, the acreage of waterbird habitat affected w Assuming that 30 to 50 percent of all mute swans are capable of breeding (Willey and Halla 1972), the nesting and territorial behavior of mute swans could be diminishing the suitability of up to 14,000 to 21,000 hectares (35,000 to 52,000 acres) of wetland habitats for nesting and foraging by native waterfowl and colonial-nesting waterbirds. ould be expected double by 2011.

4. Effects on Human Health and Safety

In the absence of population control measures, there would be increased risk of emotional trauma and physical injury to humans because of attacks initiated by increased numbers and densities of territorial swans in the coastal and estuarine habitats often frequented by people seeking outdoor recreational opportunities.

5. Effects on Aesthetic Values

For people who are enamored of mute swans and who enjoy feeding, photographing, or simply watching them, this alternative would provide increased opportunities for them to interact with and appreciate the objects of their affection due to an anticipated increase in mute swan populations. People who view mute swans as detrimental to wetland habitats and native wildlife would likely be distressed by their more frequent encounters with this species, reducing their enjoyment of outdoor activities within the current range of the mute swan.

6. Economic Effects on the Human Environment

The potential for economic losses associated with damage to personal property, agricultural crops, and fisheries resources would be expected to increase by some indeterminable factor under this alternative. Economic losses associated with efforts to restore depleted submerged aquatic grasses would mount in the face of continued heavy pressure from increased populations of the mute swan.

7. Humane Treatment and Animal Welfare Concerns

While humane treatment and animal welfare would not be expected to be

concerns in the absence of all lethal management actions, it could be argued that allowing birds to die from disease and starvation would inflict more pain and suffering on individual animals and thus be less humane than killing excess birds by shooting and euthanasia.

B. Alternative 2: Integrated Population Management (Proposed Action)

1. Effects on Mute Swan Populations

A common concern among members of the public is whether wildlife management actions are likely to affect the viability of target species populations. The target species selected for analysis in the EA is the mute swan, of which no more than 3,000 are likely to be killed in any one year in the Atlantic Flyway under depredation permits issued by the Service.

The goal of population management efforts in the Atlantic Flyway is to reduce the Flyway-wide population to about 4,675 birds and maintain it at that level (Atlantic Flyway Technical Committee 2003). Attainment of that goal will require that the current population of about 14,300 birds be reduced by 67 percent. Mute swan populations in States at the perimeter of the core breeding range may, at the discretion of State wildlife agencies, be eliminated to help prevent further range expansion and establishment of new, self-sustaining populations. Elsewhere, populations will be reduced to a level consistent with the Atlantic Flyway Mute Swan Management Plan (scheduled for publication in July 2003). The goal will be to maintain the Atlantic Flyway Mute Swan population at levels that will minimize their impacts on wetland habitats, native wildlife populations, and human interests while ensuring their long-term stability viability. Reduction of the population to 4,675 birds would return the population to pre-1985 levels, which caused relatively few documented conflicts with aquatic habitats, native fish and wildlife, and human interests; mute swans survived and prospered at far lower levels than this for more than 75 years.

The management strategy discussed above fully meets the Service's responsibilities under the MBTA to maintain a healthy, self-sustaining, and viable population of mute swans in the Atlantic Flyway, while at the same time limiting the detrimental impacts that this species is known to have on native fauna and flora. After reviewing the 85-year history of the population status of mute swans in the Atlantic Flyway (Allin 1981, Ciaranca et al. 1997, Atlantic Flyway Technical Committee 2003), and in consideration of certain demographic characteristics (e.g., high survivorship, long life-spans, and high reproductive potential), we conclude that maintaining a population of about

4,700 birds distributed among 9 States (Table 2) is more than sufficient to ensure genetic diversity of the population and to guard against the impacts of random environmental events such as flood tides, hurricanes, and other unpredictable events. The Service's primary role in implementing this strategy will be to issue migratory bird depredation permits, in accordance with 50 CFR 21.41 and the State-specific take guidelines presented in Table 2, to allow for the integrated population management of mute swans. Each permit application will be reviewed to ensure that the planned activity meets the goals and objectives of the Atlantic Flyway Mute Swan Management Plan (Atlantic Flyway Technical Committee 2003), that the proposed take does not exceed the Service's State-specific take guidelines, and that the cumulative impacts will not irreparably harm the Flyway-wide population. The State-specific take guidelines will be reviewed annually and revised as necessary to ensure that Statewide and Flyway-wide populations are not reduced below target levels (Table 2).

2. Effects on Wetland Habitat

Wetland habitats, especially submerged aquatic vegetation would benefit and respond positively to the extent that mute swan populations were reduced. Impacts would continue to occur, but at substantially reduced levels. In the event that a 67 percent Flyway-wide reduction in the mute swan population was achieved over 5 to 10 years, an additional 12.8 million kilograms (28.1 million pounds, or 14 thousand tons) of SAV would be available annually as a result of reduced foraging by mute swans.

3. Effects on Nontarget (Including Threatened and Endangered) Fish and Wildlife

Nontarget fish and wildlife populations would be expected to benefit and to respond positively to the extent that mute swan populations were reduced. Impacts would continue to occur, but at a much reduced level. Commercially and recreationally valuable shellfish and finfish, and various species of recreationally important birds–especially waterfowl–would be expected to respond positively to a projected 67 percent increase in available biomass of SAV–an important source of food and cover for a myriad of native fauna.

4. Effects on Human Health and Safety

Some people may be concerned that the use of some techniques, especially the employment of firearms, could cause injuries to people (especially when used on lands open to public access) or to non-target wildlife. The use of specially

trained wildlife professionals in the control program will minimize these types of potential dangers. The potential risk of emotional trauma and physical injury to humans because of attacks initiated by territorial swans in coastal habitats frequented by people seeking outdoor recreational opportunities would be minimized to the maximum extent by this alternative.

5. Effects on Aesthetic Values

This alternative would result in decreased opportunities for viewing and enjoying mute swans in a wild state, but such opportunities would still be readily available to people willing to make an effort to seek them out. Some individuals might feel aggrieved if their "favorite" swans are removed from the population, but opportunities for these people to interact with other mute swans will still be available. Even if the Flyway-wide mute swan population was reduced to one-third of its current (2002) population, the remaining 4,675 birds would exceed the number available for viewing by the public during the first 85 years of the species existence in the Atlantic Flyway. People who consider mute swans to be out of place in the U.S. would probably view any opportunity to spend time in wetland habitats enjoying native wildlife without encountering mute swans (or even a decreased probability of encountering mute swans) as a vast improvement in their outdoor experience.

6. Economic Effects on Human Environment

Of the four alternatives considered, this would be the most effective in reducing economic losses due to personal property damage, agricultural damage, and impacts on commercially important fisheries resources.

7. Humane Treatment and Animal Welfare Concerns

Organizations and individuals opposed to shooting of animals for any reason can be expected to oppose this alternative based on their belief that it is cruel, inhumane, unethical, and immoral. Organizations and individuals philosophically opposed to the management of wild animal populations by any means and for any reason can also be expected to oppose this alternative. Shooting and euthanasia are considered humane techniques, and the professional biologists conducting the culls will be trained in techniques to minimize pain and suffering of individual birds.

C. Alternative 3: Egg Addling

1. Effects on Mute Swan Populations

Egg addling is a common means of decreasing waterfowl reproductive output. Addling the eggs reduces the proportion of nests that successfully produce young. Because the effect of egg addling is limited to that portion of the population with the greatest natural mortality, it therefore has the least effect on population control or reduction (Cooper and Keefe 1997).

Using current demographic information, a mathematical model for a mute swan population was constructed (W. Harvey, Maryland DNR, unpublished report) that allows a comparison of how changes to reproductive output or survival rates influence growth rate and size of the population. The model was run at different levels of hatching success to stimulate various levels of egg addling effort. The simulations indicated that it would be necessary to reduce hatching success by 80 percent just to stabilize the population (Figure 3).

2. Effects on Wetland Habitat

Impacts of mute swans on wetland habitats, especially the submerged aquatic vegetation on which it feeds, would continue at the current high level, which is considered to be ecologically detrimental. Because this alternative would do little more than maintain mute swan populations at current levels, any positive benefits of this alternative to wetland habitats would be apparent only after years of concerted effort, if ever.

3. Effects on Nontarget (Including Threatened and Endangered) Fish and Wildlife

Impacts of mute swans on nontarget fish and wildlife would continue at the current high level, which is considered to be ecologically disruptive to native fauna. Because this alternative would do little more than maintain mute swan populations at current levels, benefits to wetland habitats would be apparent only years of concerted effort, if at all.

4. Effects on Human Health and Safety

This alternative would be expected to have negligible effects on human health and safety. The relatively low risk of human health and safety issues such as chance encounters between humans and aggressive swans would remain at current levels in the short-term, and gradually taper off as the mute swan population was reduced over a period of years.

5. Effects on Aesthetic Values

Opportunities for viewing and enjoying mute swans would remain high over the short-term, decline gradually as the population was reduced over a period of years, but viewing opportunities for mute swans would remain readily available to people willing to seek them out. People who are offended by the sight of any mute swan in a natural setting because of their invasive nature would continue to have their outdoor experiences devalued.

6. Economic Effects on Human Environment

This alternative would be expected have negligible effects on economic concerns. Economic impacts would remain relatively high in the short-term, but decline gradually as the mute swan population was reduced over a period of years.

7. Humane Treatment and Animal Welfare Concerns

Although they may not condone or agree with this action on ethical or moral grounds, most animal rights and animal welfare organizations view egg addling as a humane technique, so public opposition to this alternative would probably be minimal.

D. Alternative 4: Non-Lethal Control

1. Effects on Mute Swan Populations

This alternative would have no effect on mute swan populations. The rapid growth rate would be expected to continue, with a realistic expectation that the Atlantic Flyway population could be twice as large in 2011 as in 2003.

2. Effects on Wetland Habitat

Detrimental effects of overabundant mute swans on wetland habitats, especially submerged aquatic vegetation, would continue unabated and would be expected to increase in direct proportion to the size of the mute swan population.

3. Effects on Nontarget (Including Threatened and Endangered) Fish and Wildlife

Detrimental effects of overabundant mute swans on nontarget fish and wildlife would continue unabated and would be expected to increase in direct proportion to the size of the mute swan population.

4. Effects on Human Health and Safety

Site-specific impacts might be reduced, but overall impacts on human health and safety such as chance encounters between humans and aggressive swans would be similar to the No Action alternative. There might be secondary or tertiary detrimental impacts on fish and wildlife populations–and on the outdoor recreational sports directed toward those resources, such as hunting and fishing, as well as the associated human economies that they support–due to anticipated increased consumption by mute swans of the SAV on which the fish wildlife depend.

5. Effects on Aesthetic Values

This alternative would have minimal impact on people for whom viewing and interacting with mute swans on a personal level is an important part of their daily lives. People who are offended by the sight of any mute swan in a natural setting because of their invasive nature would continue to have their outdoor experiences devalued.

6. Economic Effects on Human Environment

Site-specific complaints might be reduced, but overall the number of complaints received from property owners will not be reduced the No Action level, and might even increase. The cost of trying to keep mute swans out of SAV restoration plots might become prohibitively expensive.

7. Humane Treatment and Animal Welfare Concerns

Humane treatment and animal welfare would be of no or minimal concern in the absence of lethal control actions.

E. Comparison of Impacts by Alternative

Resource Impacted	Alt 1. No Action	Alt. 2. Integrated Management (Proposed)	Alt. 3. Egg Addling	Alt. 4. Non-Lethal Control
Mute Swan Populations	Mute Swan populations would continue to increase at a rapid rate	Mute Swan populations would be reduced to, and maintained at, pre-determined levels	Mute Swan productivity would be suppressed but population would remain at elevated level for many years	Mute Swan populations would remain high and continue to increase

Wetland Habitats	Impacts on native vegetation and on habitat restoration efforts would continue unabated, and the ecological significance of the impacts would increase greatly	Impacts on native vegetation would be markedly reduced, the success of restoration efforts would improve significantly, and the ecological significance of the impacts would be noticeably reduced	Impacts on native vegetation and restoration efforts would remain high in the short-term, but gradually taper off as Mute Swan population was reduced over a period of years	Site-specific impacts might be reduced, but overall impacts on wetland habitats and restoration efforts would remain fairly high
Non-Target Fish and Wildlife	Impacts on non-target fish and wildlife would continue unabated, and ecological significance of the impacts would increase greatly	Impacts on non-target fish and wildlife would be markedly reduced, and ecological significance of the impacts would be greatly reduced	Impacts on non-target fish and wildlife would remain high in the short-term, but gradually taper off as Mute Swan population was reduced over a period of years	Site-specific impacts might be reduced, but overall impacts on non-target fish and wildlife would remain fairly high
Human Health and Safety	Increased risk of human health and safety issues such as chance encounters between humans and aggressive swans	Reduced risk of human health and safety issues such as chance encounters between humans and aggressive swans	The risk of human health and safety issues such as chance encounters between humans and aggressive swans would remain high in the short-term, but gradually taper off as Mute Swan population was reduced over a period of years	Site-specific impacts might be reduced, but overall impacts on human health and safety issues such as change encounters between humans and aggressive swans would not be reduced significantly from the NO ACTION level
Aesthetic Values	Increased opportunities for people who like Mute Swans to interact with the objects of their affection, Mute Swans would increase; increased frustration for people who view Mute Swans as detrimental to wetland habitats and native wildlife	Decreased opportunities for viewing and enjoying Mute Swans, but those opportunities would still be readily available to people willing to seek them out	Opportunities for viewing and enjoying Mute Swans would remain high over the short-term, decline gradually as the population was reduced over a period of years, but remain readily available to people willing to seek them out	Opportunities for viewing Mute Swans and enjoying the aesthetic pleasures they provide would remain suitably high
Economic Concerns	Nuisance complaints about economic damage to private property and agricultural resources would increase somewhat	Nuisance complaints about economic damage to private property and agricultural resources would be expected to diminish	Economic impacts would remain relatively high in the short-term, but decline gradually as the Mute Swan population was reduced over a period of years	Site-specific complaints might be reduced, but overall the number of complaints will not be reduced below the NO ACTION level
Humane Treatment and Animal Welfare Concerns	Not an issue in absence of lethal control actions	Organizations and individuals ethically and morally opposed to shooting animals for any reason can be expected to oppose this alternative	Egg addling is generally accepted as a humane method of population control, so public opposition should be minimal	Not an issue in absence of lethal control actions

F. Cumulative Impacts

Under the Proposed Action (Alternative 2), the integrated management of mute swans (especially lethal removal of adults in combination with egg addling) would be expected to reduce the overall Atlantic Flyway population by 67 percent over a period of 5 to10 years, to a targeted population of 4,675 birds, as proposed in the draft Atlantic Flyway Mute Swan Management Plan (Atlantic Flyway Technical Committee 2003). Populations in some States at the edge of the current range could be reduced to zero, at the discretion of the responsible State wildlife agency, without affecting long-term survivorship of the overall population. A 67 percent reduction of the feral mute swan population would have some effect on aesthetic values, but birds would remain readily available for the public to view and enjoy. Alternatives 1, 3, and 4 would be expected to result in significant cumulative environmental impacts to wetland habitats and nontarget fish and wildlife. In local situations, SAV beds could be reduced by up to 90 percent, with concomitant reductions in commercially valuable fish such as blue crabs and striped bass and recreationally important migratory birds such as Tundra Swans and dabbling ducks. None of the alternatives would have significant cumulative impacts on human health and safety, economic concerns, or humane treatment and animal welfare concerns.

VI. COORDINATION AND CONSULTATION

We began intra-Service consultation on Section 7 of the Endangered Species Act with the Service's Endangered Species Program on June 6, 2003. We conducted a review of the listed, proposed, and candidate species, and designated critical habitats, that occur in the Atlantic Flyway and have made a preliminary determination that the issuance of migratory bird depredation permits to control mute swan populations is "not likely to adversely affect" any of the above-listed species or habitats. We have also identified conditions that would be attached to the depredation permits to further ensure the protection of certain listed species. Our preliminary determination is currently being reviewed by the Endangered Species Program.

Throughout the process of preparing this EA, we have followed the advice and guidance of the Service's Environmental Coordinator on matters related to the National Environmental Policy Act.

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IX. TABLES

Table 1. Species of submerged aquatic vegetation (SAV) known to eaten by mute swans in the Atlantic Flyway.

Scientific Name	Common Name (if any)	Comments
PONDWEEDS:		
Annacharis canadensis		
Annacharis occidentalis		
Chara gobularis, var. aspera		
Ceratophyllum demersum		
Potamogeton oakesianus	Oake's Pondweed	
Potamogeton pectinatus	Sago Pondweed	An especially important food item for a variety of waterfowl (Kantrud 1990)
Potamogeton perfoliatus	Clasping-leaved Pondweed	
Potamogeton pusillus	Small Pondweed	
Myriophyllum sp.		
Najas flexilis	Brushy Pondweed	
Pontederia cordata		
Ruppia maritima	Wigeongrass	An especially important food item for a variety of waterfowl (Kantrud 1991)
Utricularia purpurea		
Vallisneria americana		
Zostera marina	Eelgrass	An especially important food item for a variety of waterfowl
ALGAES:		
Bangia fuscopurpurea		
Enteromorpha intestinalis		
Fragilaria sp.		
Lyngbya sp.		
Melosira sp.		
Ulothrix flaca		
Ulva sp.	Sea Lettuce	

Table 2. Recommended population goals for mute swans in the Atlantic Flyway (from Atlantic Flyway Technical Committee 2003).

State	2002 Population[1] Estimate	Population Goal[1] (Upper Limit)	Percent Reduction [2] Required to Reach Goal	Recommended Take Limits for FWS Depredation Permits[3]
Connecticut	1,338	ca. 200	85	212 - 317
Delaware	18	0	100	0 - 10
Florida	215	0	0	0 - 10
Georgia	1	0	100	0 - 10
Maine	0	0	0	0 - 10
Maryland	3,624	500	86	506 - 906
Massachusetts	947	ca. 1,000	0	150 - 225
New Hampshire	11	25	0	0 - 10
New Jersey	1,602	700	56	253 - 380
New York	2,848	1,000	64	450 - 676
North Carolina	14	0	100	0 - 10
Pennsylvania	348	250	42	55 - 82
Rhode Island	1,367	500	63	216 - 324
South Carolina	27	0	100	0 - 10
Vermont	0	0	0	0 - 10
Virginia	563	500	11	89 - 134
West Virginia	17	0	100	0 - 10
TOTALS	12,648	4,675	67	1,998 - 3,088

[1] All figures from Atlantic Flyway Technical Committee (2003).

[2] All figures based on Atlantic Flyway Technical Committee (2003).

[3] Recommended take limits are presented as a range of values; those in first column represent take of about 15.8 percent, those in second column a take of about 24.4 percent.

Table 3. Some examples of submerged aquatic vegetation, crabs and shellfish, finfish, birds, and mammals of commercial, ecological, or recreational importance that may co-occur with mute swans in estuarine and freshwater wetlands along the northeastern Atlantic Coast.

Submerged Aquatic Vegetation:	
Eelgrass	*Zostera maritima*
Redhead Grass	*Potamogeton perfoliatus*
Sago Pondweed	*Potamogeton pectinatus*
Widgeon Grass	*Ruppia maritima*
Crabs and Shellfish:	
Eastern Oyster	*Crassostrea virginica*
Blue Crab	*Callinectes sapidus*
Hard Clam	*Mercenaria mercenaria*
Horseshoe Crab	*Limulus polyphemus*
Grass Shrimp	*Palaeonetes pugio*
Fish:	
Alewife	*Alosa pseudoharengus*
American Eel	*Anguilla rostrata*
American Shad	*Alosa sapidissima*
Atlantic Croaker	*Micropogonius undulatus*
Atlantic Menhaden	*Brevoortia tyrannus*
Black Drum	*Pogonius cromis*
Black Sea Bass	*Centropristis striata*
Blueback Herring	*Alosa aestivalis*
Bluefish	*Pomatomus saltatrix*
Red Drum	*Sciaenops ocellatus*
Spot	*Leiostomus xanthurus*
Spotted Sea Trout	*Cynoscion nebulosus*
Striped Bass (Rockfish)	*Morone saxatilis*
Summer Founder	*Paralichthys dentatus*
Weakfish	*Cynoscion regalis*
Birds:	
Herons	
American Bittern	*Botaurus lentiginosus*
Black-crowned Night-Heron	*Nycticorax nycticorax*
Cattle Egret	*Bubulcus ibis*
Glossy Ibis	*Plegadis falcinellus*
Great Egret	*Ardea alba*
Great Blue Heron	*Ardea herodias*
Green Heron	*Butorides virescens*
Least Bittern	*Ixobrychus exilis*

Little Blue Heron	*Egretta caerulea*
Snowy Egret	*Egretta thula*
Tricolored Heron	*Egretta tricolor*
Waterfowl	
American Wigeon	*Anas americana*
American Black Duck	*Anas rubripes*
Blue-winged Teal	*Anas discors*
Brant	*Branta bernicla*
Bufflehead	*Bucephala albeola*
Canada Goose	*Branta canadensis*
Canvasback	*Aythya valisineria*
Common Merganser	*Mergus merganser*
Common Goldeneye	*Bucephala clangula*
Gadwall	*Anas strepera*
Greater Scaup	*Aythya marila*
Green-winged Teal	*Anas crecca*
Hooded Merganser	*Lophodotes cucullatus*
Lesser Scaup	*Aythya affinis*
Long-tailed Duck	*Clangula hyemalis*
Mallard	*Anas platyrhynchos*
Northern Shoveler	*Anas clypeata*
Red-breasted Merganser	*Mergus serrator*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
Ruddy Duck	*Oxyura jamaicensis*
Snow Goose	*Chen caerulescens*
Tundra Swan	*Cygnus columbianus*
White-winged Scoter	*Melanitta fusca*
Wood Duck	*Aix sponsa*
Raptors	
Bald Eagle	*Haliaeetus leucocephalus*
Osprey	*Pandion haliaetus*
Rails	
American Coot	*Fulica americana*
Black Rail	*Laterallus jamaicensis*
Clapper Rail	*Rallus longirostris*
Common Moorhen	*Gallinula chloropus*
King Rail	*Rallus elegans*
Sora	*Porzana carolina*
Virginia Rail	*Rallus limicola*
Shorebirds:	
Piping Plover	*Charadrius melodus*

American Oystercatcher	*Haematopus palliatus*
Willet	*Catoptrophorus semipalmatus*
Gulls and Terns	
Black Tern	*Chlidonias niger*
Bonaparte's Gull	*Larus philadelphia*
Caspian Tern	*Sterna caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Great Black-backed Gull	*Larus marinus*
Herring Gull	*Larus argentatus*
Laughing Gull	*Larus atricilla*
Least Tern	*Sterna antillarum*
Lesser Black-backed Gull	*Larus fuscus*
Ring-billed Gull	*Larus delawarensis*
Royal Tern	*Sterna maxima*
Mammals:	
Humans	*Homo sapiens*
Raccoon	*Procyon lotor*
White-tailed Deer	*Odocoileus virginianus*

Table 4. A preliminary list of Federally endangered or threatened species that might co-occur with mute swans in their established core range in the Atlantic Flyway.

ANIMALS	
Common Name	Scientific Name
Birds:	
Eagle, Bald	*Haliaeetus leucocephalus*
Plover, Piping	*Charadrius melodus*
Tern, Roseate	*Sterna dougallii dougallii*
Fishes:	
Sturgeon, Shortnose	*Acipenser brevirostrum*
Insects:	
Beetle, American Burying	*Nicrophorus americanus*
Tiger Beetle, Northeastern	*Cicindela dorsalis dorsalis*
Tiger Beetle, Puritan	*Cicindela puritana*

PLANTS	
Scientific Name	Common Name
Flowering Plants:	
Aeschynomene virginica	Joint-vetch, Sensitive
Agalinis acuta	Gerardia, Sandplain
Amaranthus pumilus	Amaranth, Seabeach
Astragalus robbinsii var. jesupi	Milk-vetch, Jesup's
Helonias bullata	Pink, Swamp
Rhynchospora knieskernii	Beaked-rush, Knieskern's
Scirpus ancistrochaetus	Bulrush, Northeastern

Table 5. Population status and relative abundance of the mute swan in the United States.

State (Footnotes)	Status and Relative Abundance (1)	Population Estimate Birds (2)	Source (3)	CBC (4)
ATLANTIC FLYWAY:				
Connecticut	cP	1338	a	1701
Delaware	uP	18	a	24
Florida	-	215*	a	1
Georgia	-	1	a	<1
Maine	lrW	0	a	0
Maryland	uP	3624	a	1115
Massachusetts	fP	947	a	867
New Hampshire	luP	11	a	69
New Jersey	fP	1602	a	1505
New York	lcP	2848	a	2275
North Carolina	xV	27	a	22
Pennsylvania	luP	348*	a	143
Rhode Island	cP	1367	a	268
South Carolina	xV	27	a	<1
Vermont	xV	0	a	0
Virginia	luP	563*	a	84
West Virginia	rV	17	a	3
Sub-Total:		14,313		
MISSISSIPPI FLYWAY:				
Alabama	lrP	0	-	<1
Arkansas	xV	0	c	0
Illinois	luP	200	c	181
Indiana	uP	150	b	92
Iowa	xS,rW	75*	c	<1
Kentucky	xV,xW	50	-	1
Louisiana	-	0	-	0
Michigan	fP	4224*	c	2014
Minnesota	rV	35*	c	2
Mississippi	-	0	-	0
Missouri	lrP	50	c	0
Ohio	lrS,uW	300	b	59
Tennessee	-	-	-	4
Wisconsin	uP	582	c	17
Sub-Total:		6,800		
CENTRAL FLYWAY:				
Colorado	-	<50*	c	<1
Kansas	-	0	c	<1

Montana	lrP,xV	0	c	0
Nebraska	-	<12	c	0
New Mexico	-	unknown	c	0
North Dakota	-	unknown	c	0
Oklahoma	xV	unknown	c	<1
South Dakota	-	0	c	0
Texas	-	unknown	c	3
Wyoming	-	19	c	<1
Sub-Total:		91		
PACIFIC FLYWAY:				
Alaska	-	0	c	0
Arizona	-	0	c	0
California	-	no info	c	4
Idaho	-	no info	c	2
Nevada	-	0	c	0
Oregon	-	no info	c	8
Utah	-	no info	c	1
Washington	xV	200	c	6
Sub-Total:		200		
U.S. Population		ca. 21,400		

(1) Status code definitions: P = Permanent Resident and breeder, S = Summer Resident and breeder, W = Winter Resident, V = Vagrant outside normal range during migration period. Relative Abundance code definitions: c = common, f = fairly common, u = uncommon, r = rare, x = extremely rare. Prefix definition: l = locally distributed. A dash (-) indicates that introduced feral birds were not known to occur. Source: DeSante and Pyle (1986:377-383).

(2) Figures represent the highest of 3 published estimates. An asterisk (*) indicates that the figure includes a variable proportion of captive birds. A dash (-) indicates that no estimate is available.

(3) Sources: (a) Atlantic Flyway Technical Committee (2003), (b) Ciaranca et al. (1997), (b) Nelson (1999).

(4) Mean number of birds reported annually on Christmas Bird Counts, 1996-2000. Source: National Audubon Society (2001)

Table 6. Annual trends and overall growth in mute swan populations in various geographic regions.

Geographic Region	Annual Population Trend Percent	Time Period	Overall Population Growth Percent	Time Period	
Atlantic Flyway (MSMSS)	22	1986-1999	147	1986-2002	AFC 2003
Chesapeake Bay (MSMSS)	-	-	1116	1986-2002	AFC 2003
Connecticut (CBC)	6.2	1959-1988	-	-	Sauer et al. 1996
Connecticut (MSMSS)	-	-	-3.8	1986-2002	AFC 2003
Eastern BBS Region (BBS)	11.0	1966-2002	-	-	Sauer et al. 2003
Illinois (CBC)	1.2	1959-1988	-	-	Sauer et al. 1996
Indiana (CBC)	1.5	1959-1988	-	-	Sauer et al. 1996
Maryland (MSMSS)	-	-	1273	1986-2002	AFC 2003
Massachusetts (CBC)	9.0	1959-1988	-	-	Sauer et al. 1996
Massachusetts (MSMSS)	-	-	62	1986-2002	AFC 2003
Michigan (BBS)	5.3	1966-2002	-	-	Sauer et al. 2003
Michigan (CBC)	1.9	1959-1988	-	-	Sauer et al. 1996
New Jersey (CBC)	4.8	1959-1988	-	-	Sauer et al. 1996
New Jersey (MSMSS)	-	-	203	1986-2002	AFC 2003
New York (CBC)	2.7	1959-1988	-	-	Sauer et al. 1996
New York (MSMSS)	-	-	34	1986-2002	AFC 2003
North America	6-25	1986-1999	>50	1986-1996	Nelson 1999
North America (CBC)	3.0	1959-1988	-	-	Sauer et al. 1996
Ohio (CBC)	2.7	1959-1988	-	-	Sauer et al. 1996
Pennsylvania (CBC)	0.7	1959-1988	-	-	Sauer et al. 1996
Pennsylvania (MSMSS)	-	-	8	1986-2002	AFC 2003
Rhode Island (MSMSS)	-	-	55	1986-2002	AFC 2003
s. New England (MSMSS)	-	-	25	1986-2002	AFC 2003
s. Ontario	10-15	recent	-	-	Petrie 2002
upper Mid-Atlantic (MSMSS)	-	-	87	1986-2002	AFC 2003
United States (BBS)	9.4	1966-2001	-	-	Sauer et al. 2002
USFWS Region 3 (BBS)	5.4	1966-2002	-	-	Sauer et al. 2003
USFWS Region 5 (BBS)	32.8	1966-2002	-	-	Sauer et al. 2003
Virginia (CBC)	2.6	1959-1988	-	-	Sauer et al. 1996
Virginia (MSMSS)	-	-	820	1986-2002	AFC 2003

Abbreviations: AFC = Atlantic Flyway Council, BBS = Breeding Bird Survey, CBC = Christmas Bird Count, MSMSS = Mute Swan Mid-Summer Survey. Dashes (-) indicate lack of data.

Table 7. Mute swan control activities performed in calendar year 2002 under authority of depredation permits issued by the Service.[1]

State	Permits Issued[2]	Authorized[3]				Reported[3]			
		Birds Killed	Eggs[4] Addled or Oiled	Nests[5] Treated	Birds Relocated	Birds Killed	Eggs[4] Addled or Oiled	Nests[5] Treated	Birds Relocated
REGION 1 (West Coast) - No permits issued									
REGION 2 (Southwest) - No permits issued									
REGION 3 (Great Lakes & Big Rivers)									
IA	0	-	-	-	-	-	-	-	-
IL	0	-	-	-	-	-	-	-	-
IN	0	-	-	-	-	-	-	-	-
MI	7	323(8)	Unspecified	224	2	62 (19)	89	12 (5.4)	-
MN	0	-	-	-	-	-	-	-	-
MO	0	-	-	-	-	-	-	-	-
OH	3	56 (100)	-	0	0	32 (57)	-	-	-
WI	2	75 (22)	Unspecified	35	75	63 (84)	103	15 (43)	0 (0)
TOTALS	12	454 (10)	Unspecified	259	77	157 (35)	192	27 (10)	8 (10)
REGION 4 (Southeast) - No permits issued									
REGION 5 (Northeast)									
CT	2	20 (1.5)	Unspecified	50	0	0	-	0	-
DE	5	95 (100	Unspecified	45	0	24 (25)	Unknown	1 (1.0)	-
MA	10	70 (7.4)	Unspecified	200	0	19 (27)	-	0 (0)	-
ME	13	227 (6.3)	Unspecified	635	0	0 (0)	Unknown	1 (0.44)	-
ME	0	-	-	-	-	-	-	-	-
NH	4	20 (100)	Unspecified	25	0	0 (0)	Unknown	1 (5.0)	-
NJ	3	10 (0.1)	Unspecified	155	0	0 (0)	Unknown	1 (10)	-
NY	6	272 (9.6)	Unspecified	158	0	43 (16)	Unknown	2 (7.4)	-
PA	2	60 (17)	Unspecified	100	0	2 (3.3)	Unknown	1 (1.7)	-
RI	1	0 (0)	Unspecified	120	0	0	Unknown	1 (100)	-
VA	4	510 (90)	Unspecified	250	0	0	-	0	-

VT	4	20 (100)	Unspecified	10	0	3 (15)	-	0	-
WV	0	-	-	-	-	-	-	-	-
TOTALS	54	1,304 (9.3)	Unspecified	1,748	0	91 (7.0)	Unknown	8 (0.61)	-
REGION 6 (Plains and Mountains) - No permits issued									
GRAND TOTALS	66	1,758 (10)	Unspecified	2,007	77	248 (14)	-	35 (1.7)	8 (10)

[1] All figures are from the Service Permits Issuance and Tracking System (SPITS) and constitute the most accurate data available at the time the EA was finalized, but are subject to change.

[2] Figures represent cumulative total number of mute swan depredation permits authorizing (a) lethal take only, (b) egg addling only, or (c) a combination of lethal take and egg addling.

[3] Figures in parentheses represent percentage of Statewide, Regional, or Flyway populations, as appropriate.

[4] Since clutch size can vary, permits allow all eggs in a specified number of treated nests to be addled or oiled.

[5] Nest treatment normally involves addling or oiling all eggs in the clutch, but in rare instances the nest may actually be destroyed; figures from Region 5 in this column were originally reported in the Eggs Addled or Oiled column.

Table 8. Mute swan take authorized in 2003 under depredation permits issued by the Service.[1]

State	Permits Issued[2]	Authorized[3]			
		Birds Killed	Eggs Addled or Oiled[4]	Nests Treated[5]	Birds Relocated
REGION 1 (West Coast) - No permits issued					
REGION 2 (Southwest) - No permits issued					
REGION 3 (Great Lakes & Big Rivers)					
IA	0	-	-	-	-
IL	0	-	-	-	-
IN	0	-	-	-	-
MI	11	332 (7.9)	Unspecified	473	2
MN	0	-	-	-	-
MO	0	-	-	-	-
OH	4	96 (100)	Unspecified	0	0
WI	1	75 (22)	Unspecified	35	0
TOTALS	16	503 (7.4)	Unspecified	4508	2
REGION 4 (Southeast) - No permits issued					
REGION 5 (Northeast)					
CT	5	20 (1.5)	Unspecified	90	0
DE	4	105 (100)	Unspecified	45	0
MA	5	70 (0.2)	Unspecified	30	0
MD	9	1700 (47)	Unspecified	520	0
ME	0	-	-	-	-
NH	3	10 (91)	Unspecified	25	0
NJ	8	315 (20)	Unspecified	369	0
NY	5	262 (9.2)	Unspecified	118	0
PA	3	160 (46)	Unspecified	100	0
RI	3	150 (11)	Unspecified	185	0
VA	2	300 (53)	Unspecified	250	0
VT	3	10 (100)	Unspecified	10	0

WV	0	-	-	-	-
TOTALS	50	3,102 (19)	Unspecified	1,742	0
TOTALS (excluding MD)	41	1,402 (10)	Unspecified	1,222	0
REGION 6 (Plains and Mountains) - No permits issued					
GRAND TOTAL	66	3,605 (15)	Unspecified	2,250	2

[1] All figures are from the Service Permits Issuance and Tracking System (SPITS) and constitute the most accurate data available at the time the EA was finalized, but are subject to change.

[2] Figures represent cumulative total number of mute swan depredation permits authorizing (a) lethal take only, (b) egg addling only, or (c) a combination of lethal take and egg addling.

[3] Figures in parentheses represent percentage of Statewide, Regional, or Flyway populations, as appropriate.

[4] Since clutch size can vary, permits allow all eggs in a specified number of treated nests to be addled or oiled.

[5] Nest treatment normally involves addling or oiling all eggs in the clutch, but in rare instances the nest may actually be destroyed; figures from Region 5 in this column were originally reported in the Eggs Addled or Oiled column.

X. FIGURES

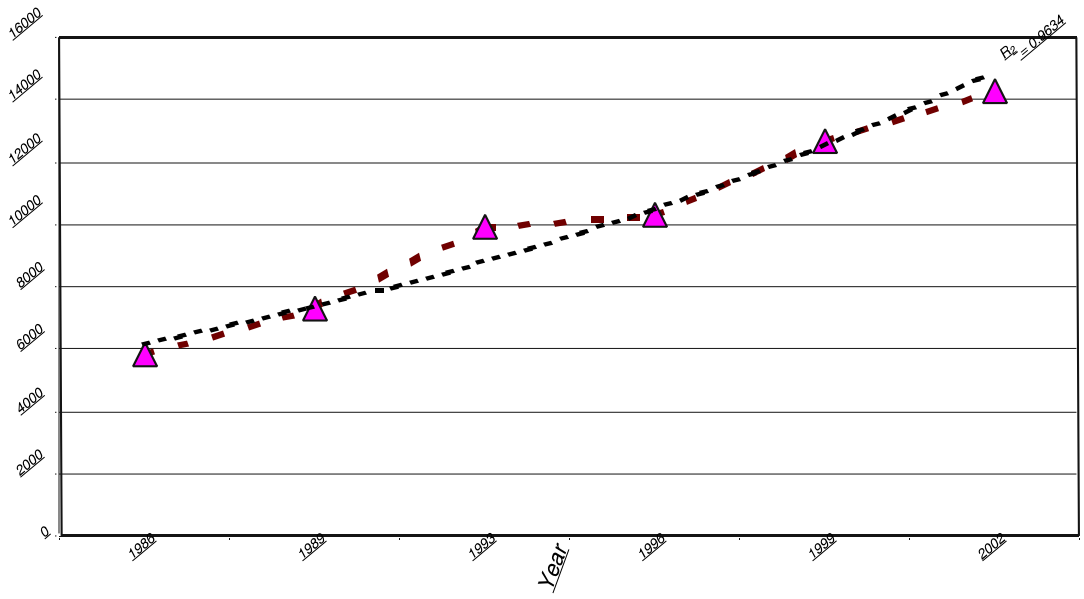

Figure 1. Mute swan population growth in the Atlantic Flyway as indicated from MSMSSs (1986-2002) and predicted annual growth rate of 9.2% (based on 146.8% growth over 16 years (Allin 2003) including its exponential growth rate.

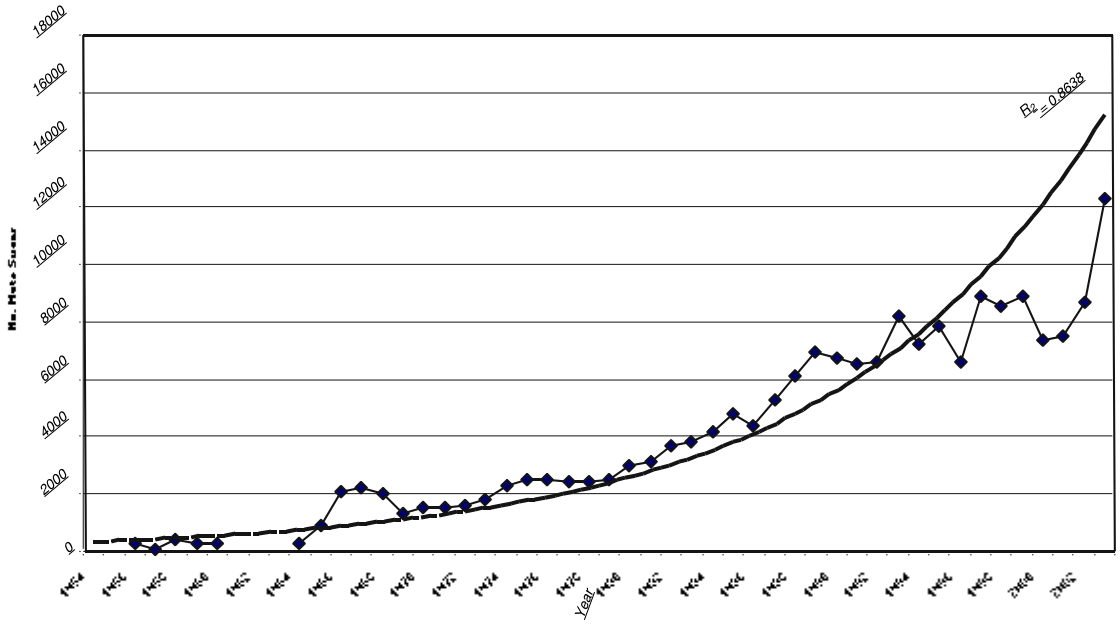

Figure 2. Mute swan population growth as indicated from the Mid-Winter Waterfowl Surveys in the Atlantic Flyway, 1954-2003 including its exponential growth rate.

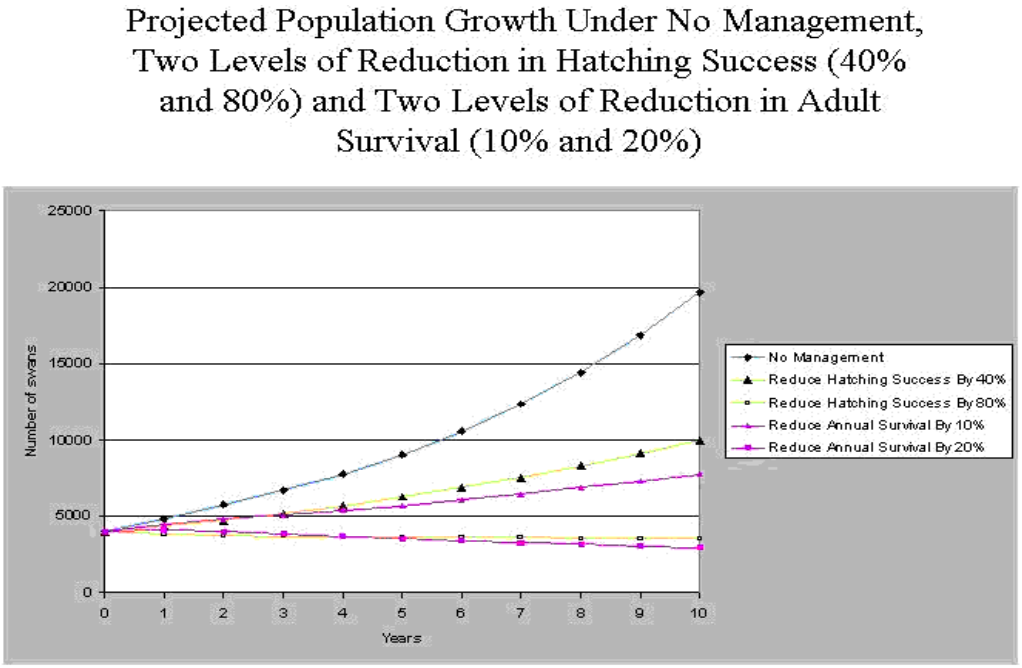

Figure 3. Projected Mute Swan Population Growth in Maryland Under Different Management Strategies (From MD Plan 2002).

IX. APPENDICES

A. **Atlantic Flyway Council Mute Swan Policy**
<http://www.dnr.state.md.us/wildlife/afcres25.html>

B. **Maryland Mute Swan Task Force Recommendations**
<http://www.dnr.state.md.us/wildlife/mstfpc.html>

C. **Maryland Mute Swan Management Plan**
<http://www.dnr.state.md.us/wildlife/msfinaltoc.html>

D. **Draft Atlantic Flyway Mute Swan Management Plan**
<http://migratorybirds.fws.gov/issues/muteswan/swanea2003.pdf >

D. **Summary of Public Comments on the Draft Environmental Assessment (Attached)**

Appendix E. Summary of Public Comments on the Draft Environmental Assessment.

On July 2, 2003, the U.S. Fish and Wildlife Service released a draft environmental assessment (DEA) on the management of mute swans in the Atlantic Flyway. A news release advising the public about the Service's proposed action and availability of the DEA was issued on July 2, 2003 (68 *Federal Register* 39593), and a conference call for the news media was held the same day. The first media reports appeared in print and on the air as early as July 3, 2003. During a 15-day public comment period, which ended on July 16, 2003, approximately 2,600 separate pieces of correspondence (emails, faxes, letters, and postcards)–the equivalent of nearly 3,000 pages–expressing the opinions and views of 13 State wildlife agencies, 53 organizations or committees, and at least 2,620 individuals. About 94 percent of the comments were submitted as emails and faxes. More than 95 percent of the individual responses resulted from Web-based action-alert form letters posted by the Fund for Animals, Friends of Animals, the Humane Society of the United States, and Save Maryland Swans. Responses were received from residents of 45 States and the District of Columbia (based on a sample of 823 responses, including 641 in which the State of residence was indicated). The ten States accounting for the greatest proportion of responses were (in declining order): California (10.1 percent), Connecticut (9.4), Maryland (8.7), New York (8.3), Florida (7.0), Massachusetts (6.2), Texas (4.8), Pennsylvania (4.1), Illinois (3.9), and New Jersey (3.7). Support for the various alternatives (with tallies of the number of respondents favoring each) are summarized below:

Support for Alternative 1: No Action. This alternative was expressly supported by 1 organization (Friends of Animals) and 12 individuals.

Support for Alternative 2: Integrated Population Management, including the issuance of migratory bird depredation permits authorizing egg addling and lethal take of adults. This alternative was expressly supported by 13 State wildlife agencies; 43 organizations dedicated to bird conservation (e.g., American Bird Conservancy and National Audubon Society), bird science (e.g., Cornell Laboratory of Ornithology and Ornithological Council–a consortium of 11 scientific ornithological societies in the Western Hemisphere), wildlife conservation (e.g., Defenders of Wildlife and Environmental Defense [Fund]), or wildlife management (e.g., International Association of Fish and Wildlife Agencies and Wildlife Management Institute); and 24 individuals. The following regional, State, and local organizations located within the Atlantic Flyway supported this alternative: Archbold Biological Station, Atlantic Audubon Society, Audubon Naturalist Society of the Central-Atlantic States, Audubon Pennsylvania, Coalition of Connecticut Sportsmen, Delmarva Ornithological Society, Georgia Ornithological Society, Izaak Walton League of America–Maryland Division, Maryland Ornithological Society, Massachusetts Audubon Society, New Jersey Audubon Society, South River Federation, Wethersfield Game Club, and The Wildlife Society–Maryland/Delaware Chapter.

Support for Alternative 3: Egg Addling. This alternative was expressly supported by 1 organization (Humane Society of the United States) and 11 individuals, including 7 for whom this was their second choice after Alternative 1.

Support for Alternative 4: Non-lethal Techniques only. This alternative was expressly supported by 1 organization (Environmental Studies at Airlie–Swan Research Program) and 12 individuals, including 2 for whom this was their second choice after Alternative 1, 3 for whom this was their second choice after Alternative 3, and 7 for whom this was their third choice after Alternatives 1 and 3.

Other Positions: Neutral responses that did not expressly support any of the four alternatives were submitted by 10 animal-rights organizations (Animal Protection Institute, Border Animal Rescue, Friends of Montgomery Village Wildlife, Potomac Valley Environmental Group, Save Maryland Swans, Students Against Animal Suffering–University of California at San Diego, and Wildlife Watch Inc.) and at least 2,589 individuals. The vast majority of these responses urged the Service to adopt non-lethal and humane techniques only, so their comments could be interpreted as support for Alternative 4, although that was not expressly stated. Many of these organizations and individuals would probably also favor Alternative 1 over Alternative 2 and some, but by no means all, might also find Alternative 3 acceptable. Most of these responses made it clear that they did not favor adoption of Alternative 2, the Service's preferred alternative, because it would allow lethal take, an action that the organizations and individuals in this group universally consider to be inhumane and not supported by the facts presented.

Responses to Issues

Issue 1: **Establish Hunting Season Frameworks.**

Service Response: The Service considered a sport hunting season as an alternative for controlling mute
swan populations but rejected it as not being particularly effective in reducing mute swan populations or maintaining them at desirable levels. We stand by that decision. States can establish mute swan hunting regulations only within the parameters of Federal frameworks authorized by the Service, and such frameworks currently do not exist.

The Service's annual regulations-setting process for migratory gamebirds would be the proper forum for proposing the establishment of Federal frameworks within which the States could select specific mute swan hunting regulations. Any such proposal would have to be vetted through the Atlantic Flyway Council and formally submitted for consideration by the Service Regulations Committee at its annual meeting.

We don't reject the notion that there might well be situations in which implementation of a mute swan hunting season might be justified (see, for example, a recent evaluation of a proposal to

allow a limited harvest of trumpeter swans [Trost 2003] and will remain open to considering such a possibility if a proposal to that effect were to be made in the future.

Issue 2: **Establish a Depredation Order.**

Service Response: If implemented under existing authority applicable to migratory gamebirds (50 CFR 21.42), a depredation order for mute swans could allow unlimited numbers of birds to be taken, without need of a Federal permit, where and when necessary to prevent "serious damage to agricultural, horticultural, and fish cultural interests." Alternatively, the Service could develop a new depredation order that would apply specifically to the mute swan. A depredation order would achieve greater administrative efficiency at the expense of sacrificing a certain degree of Federal oversight by the Service. Given that mute swans have been Federally protected for just two years and that an Atlantic Flyway Mute Swan Management Plan was formally adopted just recently (July 2003), we believe that it would be inappropriate for the Service to establish a depredation order at this time. Service oversight, exerted principally through the process of administering the issuance of depredation permits authorizing egg addling and lethal take, is essential for ensuring that the population reduction objectives of the Plan are implemented in a coordinated, orderly, and responsible manner.

Issue 3: **Remove the Mute Swan from the Protection of the Migratory Bird Treaty Act.**

Service Response: The Service could promulgate a regulation purporting to remove the mute swan from the list of birds protected by the MBTA. However, given the language of the decision in Hill v. Norton, 275 F.3d 98 (D.C. Cir. 2001), it is unlikely that such a regulation would withstand judicial challenge. The Service does not plan to use its scarce resources to promulgate such a rule at this time. Therefore, the mute swan will receive the same consideration and protection as any other migratory gamebird under provisions of the MBTA. While the MBTA provides strong measures for the protection and conservation of migratory birds, it also provides opportunities for people to use the migratory birds for sport, food, recreation, and scientific endeavors. Most importantly, the MBTA provides considerable management flexibility for dealing with situations where birds may come into conflict with human interests, as in the case of mute swans.

Issue 4: **Use Only Humane and Non-Lethal Techniques.**

Service Response: The primary objection expressed by the majority of organizations and individuals who opposed the Service's preferred alternative–integrated population management–was the inclusion of a provision that would allow lethal take under the authority of depredation permits issued by the Service. These organizations and individuals contend that shooting–the principle technique that would be used to remove adult swans from the population–is inhumane. To the contrary, the American Veterinarian Medical Association (2001) considers that (1) "a properly placed gunshot can cause immediate insensibility and

humane death," (2) "gunshot may at times be the most [or only] practical and logical method of euthanasia of wild or free-ranging species," and (3) "when other methods cannot be used, an accurately delivered gunshot is a conditionally acceptable method of euthanasia."

The Service encourages Federal and State agencies and other cooperating partners to use non-lethal
techniques whenever appropriate. In fact, the preferred alternative includes a suite of such options, from egg addling to behavioral modification, that can be employed to address mute swan problems. While all of the non-lethal techniques discussed in the EA are suitable under certain conditions, they also have severe limitations, especially when the desired management goal is population reduction to minimize environmental conflicts.

Issue 5: **Use of Egg Addling to Control or Maintain Populations.**

Service Response: Some of the organizations (e.g., The Humane Society of the United States) and individuals who opposed lethal take indicated that they would support the use of egg addling (Alternative 3) as an alternative to lethal techniques, while others (e.g., Friends of Animals) clearly stated that they opposed egg addling as well. Egg addling is generally recognized as a humane and appropriate technique for limiting reproductive success in birds. The Service considers egg addling to be an important component of the Service's preferred alternative of integrated population management, being especially useful when the management goal is to suppress reproductive output, and hence an essential supplemental tool that should be available for use by our cooperating partners. But we also believe that the history of egg addling, as practiced by various States in the Atlantic Flyway over the past 30 years, indicates that egg addling alone is not an efficient or effective technique for reducing or maintaining mute swan populations. In fact, mathematical demographic modeling indicates that egg addling alone is not sufficient for achieving stable or declining mute swan population trends. Mute swan populations would continue to increase at a slow but steady rate even if it were logistically possible to addle all the eggs in 80 percent of the nests (Figure 3 in the EA).

Issue 6: **Mute Swans Are Not the Real Reason for the Decline of Submerged Aquatic Vegetation in the Chesapeake Bay and Other Estuarine Habitats in the Atlantic Flyway.**

Service Response: We did not state or imply anywhere in the EA that the mute swan was the primary, or even a major, reason for the decline in submerged aquatic vegetation (SAV) in the Chesapeake Bay or anywhere else. We referenced factual information about the known relationships between mute swans, aquatic vegetation, and wetland habitats. This included, whenever possible, quantitative assessments of the impacts of mute swans on SAV. In all cases, we presented what we considered to be the best available scientific data on the subject. While we do not disagree that pollution and other anthropogenic factors are largely responsible for long-term declines in the abundance of SAV in the Chesapeake Bay, that argument is irrelevant. The fact remains that mute swans remove large quantities of SAV (up to 10.5 million pounds

annually in the Chesapeake Bay and upwards of 37 million pounds in the entire Atlantic Flyway) that would otherwise be available for native species of fish and wildlife.

Issue 7: **The Service Did Not Allow for Meaningful Public Comment on the Mute Swan Draft Environmental Assessment.**

Service Response: In preparing the EA, the Service made a concerted effort to "involve environmental agencies, applicants, and the public, to the extent practicable," as required by the National Environmental Policy Act (see CEQ regulations for implementing NEPA at 40 CFR 1501.4(b)). There is no requirement that the public be given a minimum of 30 days to comment on environmental assessments. Based on the volume of comments received and the range of arguments, concerns, and issues raised by proponents and opponents alike, we discount the notion that extending the public comment period would have revealed substantive new information that had not already been brought to the Service's attention during the 15-day public comment period. The Service is also trying to be responsive to the management needs of State wildlife agencies. These agencies have a limited window of opportunity in which to conduct annual mute swan control activities, requiring that depredation permits be issued in a timely fashion.

Issue 8: **The Service Must Require States to Surrender their Depredation Permits Pending Completion of the Decisionmaking Process and Issuance of a Record of Decision.**

Service Response: The court challenge filed in the U.S. District Court for the District of Columbia on May 13, 2003, on behalf of The Fund for Animals questioned the Service's decision to issue a depredation permit to the State of Maryland authorizing the take of 1,500 birds and the addling of eggs in 350 nests. The plaintiffs did not challenge any other depredation permits. They requested that the Maryland permit be set aside and that the Service not authorize "any further mute swan killing in the State of Maryland unless and until the agency complies with the requirements of the MBTA, the Conventions, NEPA, and the CEQ regulations." The plaintiffs gave the Service less three days to voluntarily rescind the permit or Plaintiffs would seek emergency relief. To allow time to fully and freely evaluate the allegations in the Complaint, the Service requested that the State of Maryland surrender its permit, which it did. We also suspended the issuance of any new depredation permits.

To ensure that our use of the categorical exclusion did not obscure identification of any significant environmental impacts, the Service initiated an environmental assessment of mute swan management in the Atlantic Flyway. The Atlantic Flyway has been used by the Service and cooperating State and Provincial agencies as the geographic basis for managing and regulating populations of MBTA-protected migratory gamebirds for more than half a century. It was intended that this assessment would be used to decide whether to issue the pending permits in the Atlantic Flyway as well another permit to Maryland should it reapply. While the Service allowed the other depredation permits, which had been previously issued by the Service in the

Atlantic Flyway and which were not challenged in the litigation, to remain in place, the Service had the ability of requesting the permittees to surrender their permit pursuant to 50 C.F.R. § 13.23(b) if the results of the environmental assessment dictated such a result.

Issue 9: **The Proposed Action Requires the Service to Prepare an Environmental Impact Statement.**

Service Response: We disagree with that conclusion, as elaborated upon in the attached Finding of No Significant Impact.

Issue 10: **The Scope of the Service's Proposed Action Does Not Consider the Environmental Effects of Issuing Depredation Permits Nationwide.**

Service Response: The geographic scope of the EA was the Atlantic Flyway. The Atlantic Flyway population of the mute swan is effectively isolated geographically from all other populations of the mute swan in the United States. A quick review of more than 500 recoveries of banded mute swans indicates a "high degree of fidelity" to the banding area; the few long-distance movements are generally to the north or south of the banding location, with "no clear record of exchange" of birds between the Atlantic and Mississippi flyway (personal communication, Mary Gustafson, Acting Chief, Bird Banding Laboratory, Patuxent Wildlife Research Center, U.S. Geological Survey). Thus, the issuance of depredation permits in the Atlantic Flyway will have no effect on other mute swan populations. We have initiated an environmental assessment of alternatives for managing mute swans in the Mississippi Flyway, and will prepare similar documents for the Pacific and (if deemed necessary) Central flyways in the near future.

Issue 11: **The Draft Environmental Assessment Does Not Adequately Analyze Alternatives to the Proposed Action.**

Service Response: We disagree. We identified 8 potential alternatives for minimizing the ecological impacts of mute swans, rejected 4 after preliminary analysis, and analyzed 4 of them in detail. All were considered deficient except for the preferred alternative (Integrated Population Management), which allows lethal take if authorized by a depredation permit issued by the Service. An analysis of "alternatives that address the 'primary' cause of the decline of SAV" is clearly outside the focus and scope of the EA.

Issue 12: **State-Specific Take Limits.**

Service Response: The recommended Statewide limits on the number of mute swans that could be taken annually under the authority of depredation permits were considered too restrictive by several State agencies, who argued that if they have the capability of reducing their State's mute swans to the desired population level in 5 years rather than 10 (as an example), then they should

be allowed to do so. The Service included the recommended the take limits as precautionary guidelines to protect against the possibility that control actions could reduce mute swans to levels substantially below the population goal. Based on our review of recent control activities in the respective States, we believe that the take limits denoted in Table 2 of the EA are liberal enough to allow the States to implement the Atlantic Flyway management plan in a meaningful way. We intend to abide by these take limits when issuing depredation permits. As noted in the EA, these guidelines will be reviewed annually and are subject to revision. Depending on circumstances, take limits could be revised upward to accommodate those States that are prepared to reduce populations over a shorter period of time, or they could be lowered to ensure that Statewide and Flyway-wide populations are not reduced below target levels.

Issue 13: **Differences In Population Goals Between the Draft EA and the Final Atlantic Flyway Mute Swan Management Plan.**

Service Response: The State-specific and Flyway-wide population goals presented in Table 2 of the draft EA accurately reflected the goals that appeared in a May 16, 2003, draft of the Atlantic Flyway Mute Swan Management Plan. While the EA was being preparws, the Atlantic Flyway Council (AFC) continued working on revisions to its draft management plan. During that time, five States reassessed their population goals, in each case revising them downward. For example the goal for Massachusetts went from 1,000 birds to 500 birds, that for New Jersey from 700 birds to 500, New York's from 1,000 to 500, Rhode Island's from 500 to 300, and Virginia's from 500 to 100. The AFC's Flyway-wide population goal was thus reduced from 4,675 birds (as presented in the draft EA) to 2,875 birds, representing a net additional reduction of 1,800 birds and resulting in a projected maximum population reduction of 78 percent (versus the 67 percent reduction projected in the draft EA). The final Atlantic Flyway Mute Swan Management Plan, which incorporated the revised population goals enumerated above, was adopted by the AFC on July 25, 2003. The Service has reviewed the revised population goals and considers them to be reasonable in that they will continue to ensure the maintenance of viable mute swan populations in the eight core States of Connecticut, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and Virginia while reducing conflicts caused by mute swans. However, because the public was asked to respond to the goals presented in the draft EA (i.e., an overall reduction of 67 percent, to a Flyway-wide population of 4,675 birds), we believe that it would be inappropriate for the Service to adopt the revised population goals at this time. Therefore, the Service will adhere to the State-specific population goals listed in Table 2 of the draft EA. The Service reserves the right to revisit this issue at some point in the future by means of a supplemental EA.

Issue 14: **Add Sodium Pentobarbital as an Authorized Method of Humane Euthanasia.**

Service Response: We understand that there may sometimes be circumstances in which take by gunshot is neither practical nor desirable. In these cases, flightless molting mute swans are live-captured and euthanized with an injection of sodium pentobarbitol. Sodium pentobarbitol is

recognized as a humane form of euthanasia by the American Veterinary Medical Asssociation's Panel on Euthanasia (2001). On a case by case basis, we will consider authorizing the use sodium pentobarbital and other appropriate forms of euthanasia recognized as humane by the AVMA on individual depredation permits.

Issue 15: **The intentional feeding of mute swans by the general public should be banned.**

Service Response: The importance of artificial winter feeding as a nutritional supplement for feral mute swans is debatable, as well is its role in overwinter survival and reproductive success. We believe that the most effective way to discourage the public from feeding wild waterfowl is not strictly by regulation, but by education. The Service long ago recognized the harmful consequences that could accrue from artificial feeding of wild waterfowl and published a leaflet entitled *Caution: Feeding Waterfowl May be Harmful!* This leaflet points out that regular feeding can cause dependency on people for food, conflicts with people, and the spread of disease. With the help of other Federal, State, and local agencies and municipal governments, the Service intends to continue spreading this message among the general public.

Issue 16: **There is a paucity of peer-reviewed data documenting current or potential future impacts of mute swans on aquatic vegetation or native species of fish and wildlife.**

Service Response: The best available scientific evidence, including peer-reviewed documents, lead us logically to infer the detrimental impacts that mute swans are causing at current population levels in the Atlantic Flyway. The available peer-reviewed data documenting current or potential future impacts was considered adequate by the 43 organizations dedicated to bird conservation, bird science, wildlife conservation, and wildlife management who submitted comments supported our preferred alternative. Thus, there is agreement among a broad array of conservation- and science-based organizations that there is adequate scientific evidence supporting the detrimental impacts of mute swans, and hence the need to reduce their populations.

Issue 17: **More research is needed to quantify any effects of mute swans on SAV and native wildlife and to support the need for population reduction.**

Service Response: While more research information is always desirable, wildlife managers usually must base their decisions on the best available data, which is exactly what has been done in this instance. We believe that the evidence supports the detrimental impacts of mute swans and that the issuance of depredation permits to reduce their populations is prudent and appropriate. We believe that delaying management action to undertake additional research would be irresponsible and simply delay the inevitable, while allowing mute swan populations to continue increasing at a rate of about 10 percent annually.